AMERICAN TECHNOLOGY PREEMINENCE ACT
H.R. 1989

HEARINGS

BEFORE THE

SUBCOMMITTEE ON
TECHNOLOGY AND COMPETITIVENESS

OF THE

COMMITTEE ON
SCIENCE, SPACE, AND TECHNOLOGY
U.S. HOUSE OF REPRESENTATIVES

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AMERICAN TECHNOLOGY PREEMINENCE ACT
H.R. 1989

TUESDAY, FEBRUARY 26, 1991

U.S. House of Representatives,
Committee on Science, Space, and Technology,
Subcommittee on Technology and Competitiveness,
Washington, D.C.

The subcommittee met, pursuant to notice, at 2:30 p.m. in room 2318, Rayburn House Office Building, Hon. Tim Valentine [chairman of the subcommittee] presiding.

Mr. Valentine. Ladies and gentlemen, we will get started with this part of our hearing. I would like to welcome each of you to the new Technology and Competitiveness Subcommittee's first hearing, which will focus on the 1992 fiscal year budget for the programs of the Technology Administration of the Department of Commerce.

During 1989 and 1990 this subcommittee, under the chairmanship of Mr. Walgren and myself, held 15 days of hearings related either to the Department of Commerce's technology programs or to the problems that United States industry confronts when competing against foreign enterprises. We looked at many topics, such as just which companies should be considered American today; how U.S. interests are taken care of in development of international standards; the relative cost of capital to U.S. companies making high technology products, and problems of the semiconductor industry.

The legislative outgrowth of all of these hearings was rolled into a single piece of legislation, the American Technology Preeminence Act, which also would have authorized appropriations for the Department of Commerce through fiscal year 1992. We were able to reach agreement on all particulars with the Senate Commerce Committee on this legislation, but we did not overcome certain political obstacles, and the bill never reached the President.

The American Technology Preeminence Act continues to be important, and today's and tomorrow's hearings on the Administration request for Technology Administration programs will constitute this year's portion of the hearing record on this bill.

We plan to move to formal consideration of the American Technology Preeminence Act as soon as possible.

It is not an accident that the American Technology Preeminence Act will be the new subcommittee's first order of business. We in the Congress must give high priority to helping U.S. industry regain a world-class reputation in quality and high technology.

I think we are all aware that the United States has suffered a steady decline in the leadership it once enjoyed as a superior technological and industrial power. The Department of Commerce report issued last year on emerging technologies was a dire confirmation of that fact. The report, which compared the U.S. competitive position with Japan and Europe in 12 emerging technologies, found the United States gaining in none, holding its own in only two, and losing ground in the rest. With a report card like that, we can only conclude that we must be doing something wrong.

This subcommittee will come back to this problem again and again over the coming months.

It is heartening to see that the Administration has proposed some significant increases for the traditional laboratory research programs at NIST. On the other hand, we are disappointed that the Advanced Technology Program has been frozen at last year's level, and other effective outreach programs, such as the State Technology Extension Program and the Non-Energy Related Inventions Program, have been zeroed out, and decreases made in the Regional Marketing Centers and fire and building research program.

We hope to explore these topics with our expert witnesses in the next two days. We are especially pleased to have Doctor White here and Doctor Bement and other distinguished personages, all well qualified. We look forward to your remarks.

I yield to the ranking member of the subcommittee, my good friend, Mr. Lewis.

[The prepared statement of Mr. Valentine follows:]

OPENING REMARKS OF
CHAIRMAN TIM VALENTINE
HEARING ON DEPARTMENT OF COMMERCE FY 1992 TECHNOLOGY ADMINISTRATION AUTHORIZATION

February 26, 1991

Good afternoon. I would like to welcome you to the new Technology and Competitiveness Subcommittee's first hearing which will focus on the 1992 fiscal year budget for the programs of the Technology Administration of the Department of Commerce.

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We hope to explore these topics with our expert witnesses in the next two days of hearings. We are especially pleased to have with us today, Dr. Robert M. White, the Commerce Department Under Secretary for Technology, and Dr. Arden L. Bement, the Chairman of the Visiting Committee on Advanced Technology for the National Institute of Standards. Both witnesses are uniquely-qualified to address the important issues related to Federal technology policy. We also welcome our other distinguished witnesses who are equally expert in their fields, and look forward to their words of wisdom.

Mr. LEWIS. Thank you, Mr. Chairman.

This is the first two days of hearings on the Department of Commerce technology programs. Most of us are familiar with the NIST role; that is the primary Federal laboratory dedicated to supporting the international competitiveness of United States business.

The members of this subcommittee in its organizational session did express strong support for this type of mission, and I would predict that any disagreements that we may have will only be on how best to achieve the goals. As many of you know, that segment of U.S. industry which has the largest positive balance of trade is aerospace; 1990 estimates indicated as high as $20 billion.

I hope we can develop this type of level of success in other U.S. business sectors. I think one of the avenues of improving U.S. competitiveness is to enhance the NIST and other related programs.

I also would like to extend a greeting to Dr. White and Dr. Bement. I look forward to your testimony today. Thank you.

Thank you, Mr. Chairman.

Mr. VALENTINE. Thank you.

Mr. Thornton, the distinguished former chairman of the SRT Subcommittee? Do you have any opening statement?

Mr. THORNTON. Thank you, sir. I would just like to congratulate you for scheduling this hearing early, Mr. Chairman, and for your leadership in the past in moving forward with the American Technology Preeminence Act. It is that kind of effort that can secure for us, I believe, an opportunity to reverse the slippage that we have had in recent years.

I am looking forward to the testimony of Dr. White and Dr. Bement.

Thank you, sir.

Mr. VALENTINE. Mr. Henry?

Mr. HENRY. Thank you, Mr. Chairman.

Just very briefly, I think I want to just remind our witnesses this afternoon that the driving interest of so many of us on this subcommittee has been applied technology and technology transfer—not at the expense of the basic science which the former NBS has had, and I know that has been the contention there, that we would slight the historical function of the agency at the expense of technology transfer. And that clearly is not our intent or the Administration's, as the budget figures indicate. But dealing with advanced technology programs, the Hollings Centers, technology transfer and diffusion, that is, I think, in particular the area that has concerned so many of us, including the chairman. We simply want to—I think I want to begin by commending NIST because I think it is making some very rapid deployments in that area, good faith efforts, but I think this is what always scares us.

We read this morning in the newspaper about Zenith licensing off its HDTV technology to a Korean firm. We really don't know what the implications of that are in terms of American ownership of what appears to be a rather remarkable technological breakthrough that many believe will be preeminent when the final sorting goes through. Many of these things are beyond our knowledge. We're not international economists, and we can't question the nature of the changing global marketplace, joint venturing, the areas of aerospace and electronics.

We see so much of our research carried off of the market. I can't stress again how important that is to us on this committee.

Thank you, Mr. Chairman.

Mr. VALENTINE. I recognize at this time our new colleague, Mr. Bacchus.

Mr. BACCHUS. Thank you very much, Mr. Chairman.

I just want to say very briefly how happy I am to serve under your leadership on this subcommittee.

I sought membership on this subcommittee, sir, for reasons of background. I was a special assistant to Reubin Askew when he was United States Trade Representative. At that time I had the privilege of representing the country abroad with many trade associations. I was able to see first-hand the changing nature of the world marketplace. I was able to see first-hand as well some of the consequences of our failure as a Nation to confront those changes.

Mr. VALENTINE. Excuse me. We are having a technical difficulty.

If any of the members deliver themselves of testimony that they believe to be immortal, if they will send us a copy, we will put it in the record.

Mr. BACCHUS. Mr. Chairman, I will save my immortal words for the floor, but I will finish with my less than immortal words here very briefly.

I was simply trying to say that I have had the opportunity to see the consequences of our failure as a Nation to confront this change. I believe that the Administration is very much on the right track in terms of renewed emphasis on space exploration, scientific research, and technology development and transfer. I believe that you are part of the Department, perhaps the most important part. I am happy to see that increases have been proposed in your budget this year. You have my support for those increases, and you have my support as someone who wants to work with you very closely in the days and years ahead, especially so in terms of your efforts to develop technology transfer and to promote cooperative ventures of State and public-private partnerships at the local level.

Thank you very much, Mr. Chairman.

Mr. VALENTINE. Thank you, Mr. Bacchus.

Mr. Ritter?

Mr. RITTER. Thanks, Mr. Chairman. It has been a pleasure to work with you in the past on the Science, Research, and Technology Subcommittee, and I know you will bring the same strong leadership to this subcommittee. Of all the many bodies in Congress, our new subcommittee—under your leadership—can play a strategic role in helping us improve our Nation's competitiveness.

Our national science effort still leads the world. Right now, our major weaknesses are in technology, especially manufacturing technology. We need to be better at turning the exciting advances of our science juggernaut into useful, affordable, reliable—in a word, competitive—products.

To counteract this trend, we need a national technology strategy based on a three-pronged approach: one, manufacturing research and development; two, technology transfer; and three, support for widespread adoption of quality principles embodied by the quality revolution in the American workplace.

In manufacturing research, we need generic technology initiatives to enhance our "Made in America" campaign. We need to concentrate our Federal R&D on those technologies that underpin our manufacturing economy, and support cutting edge R&D for civilian applications by providing seed money for promising projects in new technologies.

As new manufacturing technology is developed, we must accelerate and extend its transfer to the private sector. We need to foster a new climate of partnership between the Federal Government and the private sector.

Finally, we must build on the superb success of the Malcolm Baldrige National Quality Award in stimulating private sector quality improvement. We need a coordinating effort in quality, a subject I intend to address later in this Congress.

In summary, I welcome the witnesses and their testimony and look forward to spirited discussion about the Commerce Department's role in bolstering America's competitiveness.

Thank you, Mr. Chairman.

[The prepared statement of Mr. Ritter follows:]

HON. DON RITTER (R-PA)
OPENING STATEMENT
DEPARTMENT OF COMMERCE TECHNOLOGY PROGRAMS
FEBRUARY 26, 1991

Thank you, Mr. Chairman. It has been a pleasure to work with you in the past on the Science, Research, and Technology Subcommittee, and I am sure that you will bring the same dynamic and bold leadership that you displayed in that position to the newly reconfigured Technology and Competitiveness Subcommittee I believe that of all the many bodies in Congress, our new subcommittee--under your leadership--can play a pivotal, strategic role in helping us re-establish our competitiveness through improved U.S. technological prowess.

Our competitiveness problems stem not so much from an inferior position in science but rather from our shortcomings in technology. We need to be better at turning the exciting, proliferating advances of our science juggernaut into useful, affordable, reliable--in a word, competitive--products. Though our national science effort no longer dominates that of the rest of the world like it once did, it still leads. Yes, it too is threatened. But right now our major weaknesses are in technology--especially manufacturing technology.

Manufacturing in America represents only about 25 percent of our economy. But trade in "things"--the output of manufacturing--accounts for the great bulk of both world trade and our own shameful trade deficit. Since 1980, our cumulative trade deficit of almost $1 trillion is the most visible sign of the decline in America's manufacturing competitiveness.

We must recognize the price that we pay for our continuing trade deficits is a gradual erosion in our national economic sovereignty. Many of the dollars that we use to buy foreign goods eventually come back to purchase our assets, our lands, our companies, our industrial base. Gradually, we are turning control of our industrial base over to foreign nations. And as foreign economic power grows in this country, so too will its political influence.

We should also realize that some of our foreign competitors have adopted a strategic technology focus. They are targeting our manufacturing technologies and industries--not only those of today, but also those of tomorrow. Their objective is to be a dominant force in world trade.

To counteract these efforts and trends, we need to craft our own national technology strategy based on a three-pronged approach in (1) manufacturing research, (2) technology transfer, and (3) support for widespread adoption of Quality principles in the American workplace. The Dept. of Commerce should play a critical role in each of these areas.

In the area of manufacturing research, we need to undertake generic technology initiatives that will enhance our "Made in America" campaign. We need to concentrate our Federal R&D on those technologies that underpin our manufacturing economy. One way to do this is through NIST's Advanced Technology Program. This program is meant to undertake and support the same kind of cutting-edge R&D for civilian applications as that taking place in its military counterpart, the Defense Advanced Research Projects Agency. It provides seed money for promising projects in new technologies such as high-temperature superconductivity, biotechnology, and high definition television systems.

As our new manufacturing technology is developed, we must accelerate and extend its diffusion to the private sector. Thus, technology transfer should constitute the second leg of our national technology strategy. Technolgy transfer is a people intensive process. It is not easy to communicate knowhow. So we need to foster a new climate of partnership between the Federal Government and the private sector. We need to enhance the ability of Government to enter into joint ventures with industry, and take other actions to stimulate industrial competitiveness. We should look carefully at such efforts as IBM's highly successful Computer Integrated Manufacturing tech transfer program.

Finally, we must improve the Quality of our manufacturing processes. We must build on the superb success of the Malcolm Baldridge National Quality Award in stimulating private sector quality improvement. And that of the Federal Quality Institute as well--in helping bring about more effective management of Federal Government programs and operations and assuring that our taxpayers get improved services in return for their tax dollars. We need to create a National Quality Council, a subject that I intend to address later in this Congress.

In summary, I welcome the witnesses, and look forward to a spirited discussion about the Commerce Department's role in bolstering America's competitiveness. Thank you, Mr. Chairman.

Mr. **Valentine**. Mrs. Morella?

Mrs. **Morella**. Mr. Chairman, I am very pleased to welcome you to our wonderful subcommittee.

I am also pleased to welcome Under Secretary White, Doctor Bement, and our industry witnesses to our hearing this afternoon. I am also looking forward to tomorrow's testimony from Assistant Secretary Wince-Smith, National Institute of Standards and Technology Director Lyons, and NTIS Director Caponio.

The President demonstrated his commitment to technology in his budget by including a 13 percent increase for research and development. That increase is one of the largest in the budget.

Mr. Chairman, technology—especially technology transfer—will be a crucial factor in our Nation's economic strength. Indeed, it will be a crucial factor in our international competitiveness.

I support technology transfer programs to make federally-funded science, technology, and "know-how" more responsive to the needs of the marketplace and users in industry, academia, State and local governments, and the public. Federal technology transfer programs have contributed to the successful commercialization of new products, have helped solve industrial manufacturing problems, and have helped State and local governments influence the rate at which new technologies and practices are accepted by industry and the general public.

So again, I welcome our distinguished witnesses at this hearing and look forward to their testimony.

Thank you, Mr. Chairman.

Mr. **Valentine**. Thank you, Mrs. Morella.

All right, we are ready to hear from our distinguished witnesses.

Doctor White, if you could summarize, we would appreciate it, and your statement will appear in the record as if read.

STATEMENT OF HON. ROBERT M. WHITE, UNDER SECRETARY FOR TECHNOLOGY, DEPARTMENT OF COMMERCE

Dr. **White**. Mr. Chairman and members of the committee, I am very pleased to be able to appear before you today to testify in support of President Bush's request for appropriations for the Technology Administration of $253 million.

This request represents a substantial increase over the fiscal year 1991 level. Given that the President's total budget constitutes only a slight increase over fiscal year 1991 levels, and that Commerce as a whole requests about $78 million less than it received last year, our request indicates strong support of the Administration.

The challenge will be a severe one. The explosive pace of technological change is forcing all of us to rethink long- cherished notions about what it takes to succeed in the modern world. Our technological superiority can no longer be taken for granted. Other nations often beat us to the markets, or capture markets that we pioneered.

Given these dramatic changes, I have identified three principal goals for the Technology Administration.

The first is to promote the development and use of advanced manufacturing technology. I am gratified that many companies are beginning to rediscover the importance of being able to produce top-quality products and to produce them efficiently. Many are starting to appreciate the value of new advances, such as just-in-time delivery and the ability to adjust manufacturing operations to respond to rapidly changing market conditions.

Last week I was in Troy, New York, visiting our Manufacturing Technology Center at RPI. As part of that trip I visited a small plastics firm outside of Troy with about 100 employees. Six months ago, their process consisted of cutting dies manually, which took several weeks. They would then machine the plastic molded parts manually. But after a visit to the Manufacturing Technology Center at Troy, they adopted a CAD/CAM system. Today they receive the designs directly on a disk from customers such as IBM and Kodak, and they do their machining under numerical control. They have repaid their investment many times over, and now have a six-month backlog of orders.

One can envision the day when all products will be designed in digital form. To prepare for this, we have launched in the Technology Administration a national initiative to define a product data exchange standard. DOD and now NASA are joining with us in this grand challenge.

My second goal is to intensify the commercialization of federally-supported technologies, with special emphasis on technology developed in our Federal and National Laboratories.

The Technology Administration has been in the forefront of Federal technology transfer initiatives for more than a decade. We are particularly proud of our role in supporting and implementing the Federal Technology Transfer Act. As Secretary Mosbacher advised the President in the first biennial report on that Act, "in future years we will look back on this act as one of the seminal developments in the history of Federal efforts to put technology to work for the taxpayers who paid for it." We are currently preparing our second report, covering 1989-1990.

Today we are seeing hundreds of new cooperative R&D arrangements between Federal laboratories and the private sector that did not exist just a few short years ago. Firms are learning that the Government can be a valuable partner and agencies are giving greater emphasis to cooperative R&D and to technology transfer.

This concept of partnering deserves our attention. As a practical matter, firms are going to have to learn to form more alliances, or partnerships, of sufficient size and scope if they are to be able to create and use the new, large-scale enabling technologies. Only through such teamwork will they be able to attack these complex and expensive technologies quickly enough to be competitive.

I believe the Technology Administration can play a significant role in forging new and vital relationships that will have long-term impact on our competitiveness. Our efforts to break down the walls that have separated Federal laboratories and the commercial research world is just one example of what we do to foster new forms of cooperation.

Through the Bayh-Dole Act, which we administer, we allow universities and small businesses to own the technology they develop under Federal contracts, thereby encouraging them to seek the financial sponsorship of larger corporations or venture capitalists.

Our Clearinghouse for State and Local Initiatives in Productivity, Technology and Innovation is a treasure trove of useful information for people and firms that want to link up with potential partners.

Our Advanced Manufacturing Program in the Office of Assistant Secretary for Technology Policy and our Manufacturing Technology Centers at NIST aim not just at the dissemination of manufacturing technology, but at the creation of working relationships between smaller and medium-sized manufacturers. I should note at this point that these centers will be undergoing an outside review this year to evaluate their effectiveness.

The Advanced Technology Program is a partnership between the Government and industry in which industry takes the lead and commits the lion's share of the resources. The goal is to help industry bridge the gap between basic and applied research in pre-competitive generic technologies and thereby accelerate their development. As a side benefit, the program should also yield valuable information about the potential benefits of consortia and useful information as to how they are formed, how to make them workable, and why they fail.

The International Affairs Office, which includes our Japanese Technical Literature Program, tries to combat insularity and the so-called "Not Invented Here" syndrome by disseminating valuable information about important foreign research developments and encouraging our firms to participate in foreign research opportunities.

Our policy arm, along with Treasury, is attempting to forge a collaborative alliance between Government, the financial community, firms, pension funds, and related organizations and entities to help give us all a better understanding of the root causes of underinvestment in R&D, such as accounting standards that may make it harder for firms to justify taking the long view.

Commerce, through the Technology Administration, and the Defense Department are beginning to collaborate on new and exciting initiatives. We have just concluded a major, far- reaching interagency agreement aimed at developing, testing, and implementing standards for the digital interchange of data. Through this we hope to achieve higher quality, faster production, and lower costs for both weapons systems and commercial products. In addition, I have recently been invited by DOD to participate in the development of a National Defense Manufacturing Technology Plan to help guide future investments in manufacturing technology.

Our budget will permit our new Strategic Partnership Program to get off the ground. This will represent a new dimension in these collaborative relationships: collaboration not just between horizontal competitors at the early, pre- competitive stage, but the creation of "teams" made up of noncompeting companies throughout the process of innovation, manufacturing, and marketing. I might note that the Baldrige Award in a way aims in this direction in that it has encouraged the formation of strategic linkages between manufacturers and their suppliers, such as in the case of Motorola.

Other initiatives, such as the Administration's proposal to reduce antitrust uncertainties that may deter the formation of joint production ventures and the proposal to encourage the formation of

R&D collaborative arrangements between Federal labs and the private sector centering around federally- produced software, are still other examples of reforms that may permit beneficial cooperation.

My third goal is to meet the current and future needs of industry through improved measurement and standards support. Standards are the indispensable language of trade and commerce. Businesses need standards and test specifications to enable them to design and make products that can be sold world-wide. As the European Community moves toward an integrated market by the end of 1992 based on a unified system of standards and test procedures, the stakes for the United States will be enormous.

Accordingly, the United States will have to encourage the wider use of international standards and metric measurements within our own borders; promote greater awareness of and participation in the work of international standards bodies; and develop a coordinated strategy for working with the EC, but in a way that preserves our pluralistic system of standards development.

With these as my principal goals, I should like to say a few words about each of the principal components of the Technology Administration based on my observations since my appointment.

The National Institute of Standards and Technology appears particularly well poised to meet the challenges that were thrust upon it by the Omnibus Trade and Competitiveness Act of 1988. Events are proving that the transformation of the old National Bureau of Standards was, as the Congress intended, more than just a name change.

NIST always enjoyed a unique status as the only Federal laboratory with an explicit mission to promote industrial competitiveness. However, budgetary constraints did not always permit the allocation of sufficient resources to reflect that role. NIST's intramural laboratory programs grew in real terms by less than 10 percent over the past 15 years, while R&D spending by industry increased by 82 percent and the U.S. Government's overall R&D spending grew by 57 percent.

Despite this, NIST has done a remarkable job of meeting its mandate. For example, we do not normally think of NIST as having much to do with biotechnology. However, as this technology took on prominence in the 1980s, NIST—despite budget pressures—had to substantially develop and expand its molecular biology/protein engineering, as well as its protein crystallography capabilities. To take a slightly different example, NIST's Time and Frequency Division at Boulder won the Department's first Quality Award, our in- house version of the Baldrige award, despite its deteriorating physical condition.

The Bush Administration has determined that an organization of NIST's ability and potential should not have to labor under these unfortunate conditions. The fiscal year 1992 budget continues the momentum that began in fiscal year 1991, when NIST received a 31 percent increase in its combined appropriations. NIST's fiscal year 1992 budget represents a judicious balancing of its intramural programs, which are targeted for a 21 percent increase over fiscal year 1991 levels, and its extramural programs.

Although appropriations for the extramural programs will be slightly less than fiscal year 1991 levels, the fiscal year 1992 program obligation levels will actually be increased due to carryover funding. Intramural funding will be at $201.8 million; extramural program obligations will be slightly under $50 million.

In sum, the 1992 strategy continues the effort begun in 1991 to expand NIST's ability to develop generic technology, to address a rapidly growing number of important standards and measurement issues, to upgrade its scientific computing system, and to begin a much-needed and overdue refurbishment of its laboratory facilities.

If Congress supports the President's stated plan to double NIST's budget by 1996, NIST will indeed be well prepared to help industry meet the challenges of the 21st century.

The challenges facing the National Technical Information Service, on the other hand, are more daunting. Nobody here can seriously doubt the importance of the kind of information that NTIS makes available. Science and technical information touches everything from education and research to product development and manufacturing and, as such, plays a vital role in the innovation process. And that information is not just important to scientists and engineers. Business leaders and policymakers must also have this information available if they are to understand the problems they face and the choices they must make.

However, we must face the fact as information changes from paper to electronic formats, the Government-wide information dissemination and archival function of an agency such as NTIS has to be given a hard look. The electronic information marketplace is a decentralized, competitive one. Federal agencies are installing their own electronic systems for their particular activities, and this extends to the collection, dissemination, and processing of science and technical information.

NTIS has advised me that there is some evidence that the declining demand for written material may have bottomed out. Nevertheless, it has been preparing for a future that will increasingly be characterized by electronic formats. It is looking for new ways to reduce its per-unit costs, to make information available faster, and to make sure people know what it has available. But we should recognize that as it moves in this direction, it will face increased competition from other information-producing Federal agencies, as well as other information-dissemination agencies such as GPO.

As one Commerce official recently put it to me, we want to make sure that NTIS is more than a "technical rare book dealer." That is why I place so much store by NTIS' modernization efforts, which should substantially improve its ability to meet these challenges. Dr. Caponio will discuss its status and answer any questions you may have about it. For now, I just want to make the broad point that while issues such as accounting procedures and financial controls are important and deserve close attention, to focus on them without focussing on the broader issues of NTIS' future is to focus on the trees rather than the forest.

The third organizational component of the Technology Administration family is the Office of the Assistant Secretary for Technology Policy. It is largely through the skills and expertise of its dedicated professionals that the Technology Administration has been able to make its mark within the councils of the Commerce Department and the interagency S&T policy process. That office has provided Ms. Wince-Smith and me with invaluable assistance and insights in connection with our participation in various interagency fora and in ensuring that domestic and international S&T policy issues are properly integrated. This will take on increasing importance as other countries develop strategies for ensuring that they get their share of the world technology pie.

Of course, that office is more than just a policy shop. Its Assistant Secretary has informed me that one of her top priorities in the coming year is to increase the focus on, an d industry participation in, the specific programs for which she is responsible, including the Clearinghouse on State and Local Initiatives, the Japanese Technical Literature Program, the National Medal of Technology, Federal metrication programs, and our Federal Technology Management programs. Ms. Wince-Smith will describe her plans in greater detail when she testifies.

In short, Mr. Chairman, I believe Technology Administration's birth pangs are behind it and it is ready to assume the major role in Federal science and technology issues that Congress intended for it. I will be pleased to answer your questions.

[The prepared statement of Dr. White follows:]

STATEMENT OF

DR. ROBERT M. WHITE

UNDER SECRETARY OF COMMERCE FOR TECHNOLOGY

BEFORE THE

SUBCOMMITTEE ON TECHNOLOGY AND COMPETITIVENESS

HOUSE COMMITTEE ON SCIENCE, SPACE AND TECHNOLOGY

FEBRUARY 26, 1991

Mr. Chairman and members of the Committee, it is a pleasure to be here today to discuss President Bush's budget proposals for the Technology Administration for Fiscal Year 1992.

The President has recommended to the Congress that the Technology Administration be funded in Fiscal Year 1992 at a level slightly in excess of a quarter of a billion dollars, or $253 million. Factoring in the amounts that our self-supporting National Technical Information Service expects to obligate, TA as a whole will operate at a level of about $313 million.

The figure of $253 million includes $248 million for the National Institute of Standards and Technology and approximately $5 million for my office and the Office of the Assistant Secretary for Technology Policy. These reflect increases of about 15% and 18%, respectively, over Fiscal Year 1991 levels. Most significantly, as the President's budget noted, NIST's long-term budget should nearly double by 1996.

The Technology Administration, the newest member of the Commerce family, is very pleased that it has been targeted for such an increase. To put our request in context, I note that the President's $1.58 trillion total budget, in terms of budget authority, constitutes only a 3.8% increase over fiscal year 1991 levels. Indeed, Commerce as a whole is requesting $78 million less than it received in Fiscal Year 1991.

But the challenges that face us as the twentieth century winds down will not be solved by money alone. A new realism is called for. Much of what we have long taken for granted is undergoing dramatic change. U.S. technological superiority can no longer be taken for granted. Other nations beat us to the marketplace or capture markets that we pioneered. The nation that astounded the world with its assembly lines and its management expertise now often finds itself outclassed and outdistanced by its competitors. The explosive pace of technological change is forcing all of us to rethink long-cherished notions about what it takes to succeed in the modern world.

Given these dramatic changes, I have identified three principal goals for TA. The first is to advance the development and use of advanced manufacturing technologies and techniques.

The importance of manufacturing excellence and uncompromising dedication to quality cannot be overstated. Many companies are rediscovering the importance of being able to produce top-quality products and to produce them efficiently. Many are beginning to appreciate the value of new advances, such as just-in-time delivery and the ability to adjust manufacturing operations to respond to rapidly changing market conditions. But even this is only the tip of the iceberg. Our emphasis on manufacturing excellence and commitment to quality derive from even deeper considerations.

Beyond improving productivity and quality, advanced manufacturing technology reduces the time, cost and ease of introducing new products and making incremental product improvements. For example, old-style inflexible manufacturing facilities are costly to change and, over time, can become a deterrent to the introduction of product changes and to progress. Put in the simplest terms, manufacturing is an essential part of the innovation, or technology commercialization, process, and must be recognized as such.

Through this process of constant refinement made practicable by manufacturing excellence, chips become denser and more powerful, engines become more efficient, and other products and processes experience equally dramatic transformations.

The failure to recognize and act upon this answers a large part of the riddle of why the United States often makes exciting breakthroughs, wins Nobel Prizes, is often first to develop a new product, but then loses the market over time to competitors who have achieved mastery of the manufacturing process and can keep turning the product over and over quickly and efficiently, enabling it to take on new features and attributes along the way.

As the experience of nations that have mastered manufacturing technology often attests, scientific prowess and dramatic laboratory breakthroughs are not always enough to guarantee commercial success. Manufacturing excellence is an indispensable part of the formula for success.

Our larger companies are recognizing this, but as I move about the country I cannot help but sense that only a fraction of our smaller and medium-sized ones - those with only a few hundred employees at most and who constitute the backbone of U.S. manufacturing enterprise - seem to be aware that the rules of the game have changed. Those are the ones to whom we must reach out through the active dissemination of information on new manufacturing technologies and techniques, while leaving it to the private sector to determine how its needs can best be met.

My second goal is to intensify the commercialization of federally supported technologies, with special emphasis on technology developed in our federal and national laboratories.

The Technology Administration has been in the forefront of federal technology transfer initiatives for more than a decade. We are particularly proud of our role in supporting and implementing the Federal Technology Transfer Act. As Secretary Mosbacher advised the President in the first biennial report on that Act, "in future years we will look back on this Act as one of the seminal developments in the history of federal efforts to put technology to work for the taxpayers who paid for it." We are currently preparing our second report covering 1989-1990.

Today we are seeing hundreds of new cooperative R&D arrangements between federal laboratories and the private sector that did not exist just a few short years ago. Firms are learning that the government can be a valuable partner and agencies are giving greater emphasis to cooperative R&D and to technology transfer.

This concept of partnering deserves our attention. As a practical matter, firms are going to have to learn to form more alliances, or partnerships, of sufficient size and scope if they are to be able to create and use the new, large-scale enabling technologies. Only through such teamwork will they be able to attack these complex and expensive technologies quickly enough to be competitive.

I believe the Technology Administration can play a significant role in forging new and vital relationships that will have long-term impact on our competitiveness. Our efforts to break down the walls that have separated federal laboratories and the commercial research world is just one example of what we do to foster new forms of cooperation:

o Through the Bayh-Dole Act, which we administer, we allow universities and small business to own the technology they develop under federal contracts, thereby encouraging them to seek the financial sponsorship of larger corporations or venture capitalists.

- Our Clearinghouse for State and Local Initiatives in Productivity, Technology and Innovation is a treasure trove of useful information for people and firms that want to link up with potential partners.

- Our Advanced Manufacturing Program in the Office of Assistant Secretary for Technology Policy and our Manufacturing Technology Centers at NIST aim not just at the dissemination of manufacturing technology, but at the creation of working relationships between smaller and medium-sized manufacturers. I should note at this point that these Centers will be undergoing an outside review this year to evaluate their effectiveness.

- The Advanced Technology Program is a partnership between the Government and industry in which industry takes the lead and commits the lion's share of the resources. The goal is to help industry bridge the gap between basic and applied research in pre-competitive generic technologies and thereby accelerate their development. As a side benefit, the Program should also yield valuable information about the potential benefits of consortia and useful information as to how they are formed, how to make them workable, and why they fail.

- The International Affairs Office, which includes our Japanese Technical Literature Program, tries to combat insularity and the so-called "Not Invented Here Syndrome" by disseminating valuable information about important foreign research developments and encouraging our firms to participate in foreign research opportunities.

- Our policy arm, along with Treasury, is attempting to forge a collaborative alliance between government, the financial community, firms, pension funds and related organizations and entities to help give us all a better understanding of the root causes of underinvestment in R&D, such as accounting standards that may make it harder for firms to justify taking the long view.

- Commerce, through the Technology Administration, and the Defense Department are beginning to collaborate on new and exciting initiatives. We have just concluded a major, far-reaching interagency agreement aimed at developing, testing and implementing standards for the digital interchange of data. Through this we hope to achieve higher quality, faster production, and lower costs for both weapons systems and commercial products. In addition, I have recently been invited by DoD to participate in the development of a National Defense Manufacturing Technology Plan to help guide future investments in manufacturing technology.

- Our budget will permit our new Strategic Partnership Program to get off the ground. This will represent a new dimension in these collaborative relationships: collaboration not just between horizontal competitors at the early, pre-competitive stage, but the creation of "teams" made up of noncompeting companies throughout the process of innovation, manufacturing and marketing. I might note that the Baldrige Award in a way aims in this direction in that it has encouraged the formation of strategic linkages between manufacturers and their suppliers, such as in the case of Motorola.

Other initiatives, such as the Administration's proposal to reduce antitrust uncertainties that may deter the formation of joint production ventures and its proposal to encourage the formation of R&D collaborative arrangements between federal labs and the private sector centering around federally-produced software, are still other examples of reforms that may permit beneficial cooperation.

My third goal is to meet the current and future needs of industry through improved measurement and standards support.

Standards are the indispensable language of trade and commerce. Businesses need standards and test specifications to enable them to design and make products that can be sold worldwide. As the European Community moves toward an integrated market by the end of 1992 based on a unified system of standards and test procedures, the stakes for the United States will be enormous.

Accordingly, the United States will have to encourage the wider use of international standards and metric measurements within our own borders; promote greater awareness of, and participation in, the work of international standards bodies; and develop a coordinated strategy for working with the EC, but in a way that preserves our pluralistic system of standards development.

With these as my principal goals, I should like to say a few words about each of the principal components of the Technology Administration based on my observations since my appointment.

The National Institute of Standards and Technology appears particularly well-poised to meet the challenges that were thrust upon it by the Omnibus Trade and Competitiveness Act of 1988. Events are proving that the transformation of the old National Bureau of Standards was, as the Congress intended, more than just a name change.

NIST always enjoyed a unique status as the only federal laboratory with an explicit mission to promote industrial competitiveness. However, budgetary constraints did not always permit the allocation of sufficient resources to reflect that role. NIST's intramural laboratory programs grew in real terms by less than 10% over the past fifteen years, while R&D spending by industry increased by 82% and the U.S. Government's overall R&D spending grew by 57%.

Despite this. NIST has done a remarkable job of meeting its mandate. For example, we do not normally think of NIST as having much to do with biotechnology. However, as this technology took on prominence in the eighties, NIST, despite budget pressures, had to substantially develop and expand its molecular biology/protein engineering as well as its protein crystallography capabilities. To take a slightly different example, NIST's Time and Frequency Division at Boulder won the Department's first Quality Award - our in-house version of the Baldrige Award - despite its deteriorating physical condition.

The Bush Administration has determined that an organization of NIST's ability and potential should not have to labor under these unfortunate conditions. The FY 92 budget continues the momentum that began in FY 91 when NIST received a 31% increase in its combined appropriations. NIST's FY 1992 budget represents a judicious balancing of its intramural programs (which are targeted for a 21% increase over Fiscal Year 1991 levels) and its extramural programs.

Although appropriations for the extramural programs will be slightly less than FY 1991 levels, FY 1992 program obligation levels will actually be increased due to carryover funding. Intramural funding will be at $201.8 million; extramural program obligations will be slightly under $50 million.

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If Congress supports the President's stated plan to double NIST's budget by 1996, NIST will indeed be well prepared to help industry meet the challenges of the 21st century.

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Assistant Secretary has informed me that one of her top priorities in the coming year is to increase the focus on, and industry participation in, the specific programs for which she is responsible, including the Clearinghouse on State and Local Initiatives, the Japanese Technical Literature Program, the National Medal of Technology, federal metrication programs, and our Federal Technology Management programs. Ms. Wince-Smith will describe her plans in greater detail when she testifies.

In short, Mr. Chairman, I believe TA's birth pangs are behind it and it is ready to assume the major role in federal science and technology issues that Congress intended for it. I will be pleased to answer your questions.

Mr. VALENTINE. Thank you, Dr. White.
Dr. Bement?

STATEMENT OF ARDEN L. BEMENT, JR., CHAIRMAN, VISITING COMMITTEE ON ADVANCED TECHNOLOGY, NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY; AND VICE PRESIDENT OF SCIENCE AND TECHNOLOGY, TRW, INC., CLEVELAND, OHIO

Dr. BEMENT. Mr. Chairman and members of the committee, I am pleased to appear before you today as the chairman of the Visiting Committee on Advanced Technology of the National Institute of Standards and Technology. As the Institute's principal private sector policy advisor, the committee works closely with NIST's senior management, reviewing and making recommendations on the Institute's general policy, programs, organization, and budget.

Besides myself, the committee includes eight other members with diverse backgrounds: Dr. William Howard, the vice chairman of the committee and a Senior Fellow of the National Academy of Engineering; Dr. John Bollinger, Dean of Engineering at the University of Wisconsin; Dr. Jeanette Grasselli, Distinguished Visiting Professor and Director of Research Enhancement at Ohio University; Dr. Edward Heffron, Director of the Food Division of the Michigan Department of Agriculture; Dr. Robert Lucky, Executive Director of Research, Communications Sciences Division, AT&T Bell Laboratories; Dr. Richard Nicholson, Executive Officer of the American Association for the Advancement of Science; Professor Nam Suh, Ralph and Eloise Cross Professor of Manufacturing and Mechanical Engineering at the Massachusetts Institute of Technology; and Dr. Albert Westwood, Vice President of Research and Technology, Martin Marietta Corporation.

We wish to note also the many contributions of Dr. William Slichter, a member of the committee from 1988 until his death in October, 1990. Before his retirement, Bill was Executive Director of Research in Materials Science and Engineering at Bell Laboratories. Bill served the National Institute of Standards and Technology over the last 22 years in several important advisory capacities, including a five- year term as chairman of the Institute's Board on Assessment. His devotion to the Institute was extraordinary, and he is missed as a valuable counselor and a good friend.

Today I will summarize the findings and recommendations of the Visiting Committee as an independent, private sector advisory body. I am also speaking from my perspective as Vice President of Science and Technology of TRW, Inc., and as a former researcher, teacher, and manager in industry, Government, and academia during a 35-year career. My opinions on the Federal Government's role in promoting technological competitiveness draw on my earlier service as Deputy Under Secretary of Defense for Research and Advanced Technology, and as the Director of the Office of Materials Science at the Defense Advanced Research Projects Agency.

My testimony will follow closely the Visiting Committee's 1990 annual report, which the Secretary of Commerce recently sent to you, and which I submit as an attachment to my written statement.

I want to begin by congratulating, on behalf of the committee, NIST's new leadership on a successful first year. The new director, John Lyons, and his management team have demonstrated genuine enthusiasm for the Institute's expanded industrial outreach activities. At the same time Dr. Lyons, with his background in the NIST laboratories, brings with him a deep commitment to excellence in the Institute's research.

We are also delighted with the close working relationship developing between the Institute and the Technology Administration. Bob White, the new Under Secretary for Technology, is firmly behind the Institute and, as his statement makes clear, is increasing the Department of Commerce's visibility and stature in technical affairs.

Let me turn now to NIST's new industrial outreach programs. The Manufacturing Technology Centers program, the first to get under way, has been in operation for just over two years. In our opinion, the program is off to a fine start. One measure of its performance, the return on investment, has been excellent. In the program's first 18 months, small companies said that they received about $75 million in economic benefits—from a Federal outlay of about $9 million. Looking beyond the numbers, we think that the program is really helping small businesses to turn themselves around and, in the process, it is teaching us what kinds of technological assistance they really need.

In September 1990 we issued a report on the MTC program after a year-long study. Copies of the report were sent through NIST to this committee; I have also brought additional copies today. We visited each of the first three centers for a first-hand look; we talked to their managements and staffs, and to some of their small company clients. We came away impressed with the enthusiasm and capabilities of the centers and the services they deliver to their clients.

These clients, our small businesses, are the backbone of the American industrial system. Roughly 350,000 in number, they supply our large companies, and their fortunes are linked together. Motorola, a first-year winner of the Malcolm Baldrige National Quality Award, has said emphatically that its product quality ultimately depends on what comes in the door from its suppliers.

Unfortunately, many of our small companies have been left behind by the rapid march of technology. However, we must not sell them short; the majority are clever and resourceful. If you give them access to the technology they need and help them with training and implementation, they will know what to do from there. That's how the Manufacturing Technology Centers work, offering a helping hand; the enterprising firms will step forward to grasp it.

Another new outreach effort, the Institute's Advanced Technology Program, could become the primary Government- industry joint venture to spur the commercialization of strategically-important technologies. During the program's first solicitation, industry responded with 249 proposals. The ATP managers tell us that industry was ready with more solid ideas than the program can support. We take that as a very promising sign for the future.

As the program gets under way, we have some recommendations.

The first concerns program direction and philosophy. The Advanced Technology Program has a clear mission; it must stay focussed on those critical technologies that can improve U.S. industrial competitiveness. The second, no less important, concerns accountability. To be successful, the program must attract and fund ventures that will accelerate the development of new commercial products and processes. Ultimately, the Advanced Technology Program must lead to more than developmental advances.

To make a real difference in our competitive position, the ATP will also have to fund technology ventures with critical mass; that is, ventures that are large and ambitious enough to produce exciting technical gains. As the program grows, we would also like to see some funds invested in very high-risk, high-payoff ventures, that is, those that have the potential to open up"blockbuster" global markets for U.S. industry.

With the program's rapid growth, any recommendations on venture selection and program management aim at a moving target. Our annual report presents our thoughts on these subjects, with the understanding that we will continue to reexamine them with ATP management as time goes on.

The Institute's science and engineering research programs are its technology drivers. They underpin the new industrial outreach programs and feed technology directly to industry through arrangements such as consortia and other partnerships with U.S. firms. Generally, the laboratories are in very good health from the standpoints of programs and performance. Their main problems over the last few years have been budgetary ones and, as I will discuss later, we are cautiously optimistic that better times are at hand. Research quality is high, and the research programs are in line with the Institute's mission.

In our visits to NIST we have seen some new technology that is not only significant, but exciting. If you haven't done so recently, I encourage you to visit NIST and learn about its research firsthand. In my limited time this morning I will try to capture the spirit of the laboratories by telling you about two of this year's noteworthy accomplishments.

In 1990, the laboratories excelled in the R&D 100 Awards competition, winning five awards and sharing two more with other organizations. I want to emphasize that these awards honor the 100 most significant technical innovations that have highest commercial potential each year. NIST's total of seven award winners tied for the highest obtained by any organization. Since entering the competition for the first time in 1973, NIST has won the award 71 times to rank third on the all-time winner list, and first among Federal laboratories.

The Institutes winning entries for 1990 are:

An information retrieval system that is faster and easier to use for accessing information from large textual databases;

A Scanning Scattering Microscope that produces three- dimensional-like images of surfaces at nanometer dimensions. One potential industrial application is measuring and imaging surface roughness of polished semiconductor wafers for electronic devices;

A pulse-measurement instrument that makes real-time measurements of rapid pulses in electrical insulators subjected to stress that can lead to electrical breakdown. The device can also be used to study other pulsating phenomena, such as the human heartbeat or pulses in fluids;

A novel method for growing single crystals of proteins and other substances that will contribute to advances in drug design and protein engineering;

A real-time radiation dosage monitor useful in quality control of widely-used industrial processes, such as polymer curing and sterilization of medical instruments;

High-efficiency silicon photodiodes with potential applications in sensors for industrial processes, detectors for imaging systems, and compact photometers for space and defense systems; and

A cryogenic refrigerator with no moving parts that has potential applications in cooling high-temperature superconducting devices and satellite-based detectors.

The Institute's proficiency in winning the award prompted us to ask NIST to document the actual commercial impact of its past and present R&D 100 awards. The story is an interesting one on which we plan to report in 1991.

This year, too, the Institute's Time and Frequency Division in Boulder, Colorado won the Secretary of Commerce's first Annual Quality Award. The division maintains the Nation's time standard and keeps the U.S. at the forefront of basic time-measurement research. Its reliable, high quality time services are indispensable for broadcasting and telecommunications, electrical power distribution, air traffic control, navigation, and other aspects of commerce where accurate timekeeping is essential. The Institute leads the way with a fine example as the Department of Commerce initiates its internal Total Quality Management system.

While I am on the subject of quality, let me turn to NIST's own Total Quality Management program. Total Quality Management has been a continual theme in our meetings with the Institute this year. We are encouraging the Institute to make its new formal TQM program a cornerstone of its culture. To focus the program and increase its visibility, we recommend that NIST establish an Institute-level quality award to recognize excellence and to spur quality consciousness.

As a result of legislation over the past several years, NIST has some powerful new ways to work with industry. The result has been that collaborations with industry are booming. The success of these collaborations depends upon externally- oriented industrial relations policies that promote strong working relationships. We attach great importance to such policies because they are the very foundation on which all of the Institute's industrial collaborations are built.

In mid-1989, with our strong endorsement and support, the Institute began a thorough examination of its industrial relations policies. After careful consideration, the Institute adopted industrial relations policies that are, we believe, as clear and proactive as any in the Federal Government.

Our annual report reviews the new policies. I will only mention here what we think are the three most significant aspects of them.

First, the new policies balance NIST's role as a close research collaborator with individual companies/consortia with its role as an open and impartial technology resource for all U.S. companies.

Second, they give clearer guidance on intellectual property arrangements in collaborations. In our opinion, this was perhaps the most significant part of the new policies and should be a key that will help to open many more doors to prospective industrial partners.

Third, the new policies include plans for an overhaul of the Institute's patent management system to keep pace with a surge in patentable technology from its laboratories in the last few years.

While we congratulate NIST on a job well done, we hasten to add that the job is not yet complete. Now that NIST has adopted these new policies, it must implement them. We have recommended that NIST management give this task a high priority in the coming year.

I would like to turn now to the Institute's budget. I am happy to report that the budget picture is brighter than it was when I testified before this committee a year ago. The budget process, it appears to us, is beginning to catch up to the directives of the Omnibus Trade and Competitiveness Act of 1988. The 1991 budget allowed the new industrial outreach programs to move ahead and gave a much-needed shot in the arm to the laboratories. The President's 1992 budget, released since our annual report went to press, gives similar cause for optimism despite the fiscally difficult times. As the Institute's budget picture has improved, we have turned our attention from the overall funding picture of budget priorities. This year we commend two special budget issues to your attention.

To begin, I regret to report that the Institute's physical plant is seriously in need of upgrades and repairs. In several areas, NIST's facilities simply do not measure up to the demands of modern technical programs or, in some cases, do not comply with new safety and environmental requirements. I and the other members of the Visiting Committee have seen many of the Institute's facilities problems first-hand. We have described the problems in our annual report and in even more detail in a special report in NIST facilities released last July.

I won't beat around the bush: the problems are serious. They are going to cost a lot of money to fix, and the process will take several years. The $4 million in the President's 1992 budget earmarked for this purpose is a good start. While we recognize that fixing an aging physical plant may not be a glamorous issue, perhaps not other budget item is as important to the long-term well being of the Institute.

The budget process can also help to ensure that the momentum of the Malcolm Baldrige National Quality Award will be sustained. The program has rapidly become a focal point for the Total Quality movement in the United States. Its impact on U.S. industry extends far beyond rewarding our best firms. Thousands of other companies are moving up the quality curve, using the award criteria as self-assessment tools. Just last year, the program distributed over 180,000 sets of award guidelines. The award itself is becoming recognized world-wide as a symbol for the highest U.S. achievements in Total Quality Management.

The Baldrige Award program was started with an industrial endowment that was supposed to pay for operating the program. The problem, however, is that the Nation's exploding demands for quality leadership have quickly exceeded what the current income from that endowment can supply.

We propose a two-pronged solution. First, we think that Federal support of the Federal role in managing the Baldrige program represents, dollar for dollar, as worthwhile an investment as the Federal Government can make in the economic future of this country. At the same time, we believe that the program's Board of Overseers should explore ways to broaden the base of the program with increased private sector funding, which should always account for a substantial fraction of the program's total support. Our primary goal must be to ensure that the program, which has come to symbolize industrial quality in this country, will operate at the highest level of quality itself and will embrace the full range of U.S. manufacturing and service industries. Nothing less will do.

I will conclude my comments on the NIST budget with the Visiting Committee's endorsement of the laboratory research initiatives for 1992. NIST, as usual, has proposed an excellent slate of new and expanded research priorities:

An initiative in electronics will support the huge semiconductor manufacturing and magnetic recording industries, and will accelerate progress in the emerging field of superconductivity;

The Manufacturing Technology and Standards initiative attacks manufacturing technology needs on a broad front. The initiative will develop technology for a new generation of "intelligent" machines and for digital exchange of product data, and will support industrial advances in materials processing and chemical measurements;

The Information Technology initiative includes development of microwave and lightwave communications technology and assistance to industry in networking and implementing new digital information transfer networks. The Institute will also expand its work to prevent unauthorized access and disruption in electronic communications; and

The Earthquake Hazard Reduction initiative expands a program to improve standards and practices for seismic design and construction, a matter of increasing concern across the Nation.

These initiatives meet clearly-identified national needs, they are consistent with the Institute's mission, and they were designed to use the Institute's special skills to full advantage. We recommend them to you highly.

My final subject this morning is the Institute's role in our national effort to improve our technological competitiveness. Concerned citizens in both the public and private sectors, including the members of your committee, have given much thought to the Federal Government's support of science and technology in the interest of America's economic future. Many have called for clearer and more aggressive policies; some have proposed forming new agencies or reshaping existing ones.

The Institute has been thinking about the future, too. NIST is deeply involved in developing a vision for the future and a plan to meet new opportunities and challenges. In the process, they have looked to the experiences of other Federal technical agencies such as the National Institutes of Health and DARPA. NIH has become the world leader in medical technology by combining a large internal research program with a large contract research effort. The internal and external programs compliment each other superbly. DARPA, as has perhaps never been clearer, has done an outstanding job of maintaining the technology readiness of the U.S. military. We believe that NIST will be similarly preeminent in commercial technology if the Federal Government achieves the consensus and provides the resources necessary for that to happen.

In fact, I will go further. In the last few years, the National Institute of Standards and Technology, with its Advanced Technology Program, the Manufacturing Technology Centers, the Malcolm Baldrige National Quality Award, strong science and engineering research, and a host of other industry-oriented programs, has already become a focal point for Federal efforts to raise our competitiveness. We believe that the Institute's arsenal of industry-oriented programs is unmatched anywhere.

I leave you, then, with this thought. As you continue to formulate civilian technology strategies, we urge you to recognize NIST's central role and use its capabilities. The most expeditious way to achieve our goal is to build on the foundation that has already been laid, with your continuing support.

As I was preparing for this hearing, I re-read my testimony from last year to see what progress we have made in the intervening 12 months. In terms of fundamental change, that's not very long. However, the last year has been an active one.

The Institute's budget picture has improved, with funding increases balanced between technology development and technology transfer. As a result, there is less worry both inside and outside the Institute about the new outreach programs siphoning money from the laboratory programs. Looking down the road, we would like to see the laboratory and outreach programs become more integrated. The ultimate goal is a seamless transition from technology development to technology transfer.

With its programs in order, NIST has turned its attention to strategic planning. The Visiting Committee is consulting with NIST regularly in this exercise, to which we give the highest priority. We believe that an agency which has much to offer to the technical and economic vitality of the Nation has never had more important work to do.

All of this fits with recent events on a larger scale. The Visiting Committee observes that the competitiveness debate is shifting from philosophy to practicality. As an example, the U.S. Technology Policy statement from the Office of Science and Technology Policy recently recognized the legitimate role of the Federal Government in generic, enabling technology development in the precompetitive phase. We point out that the first written definitions of the terms "generic technology" and "pre-competitive technology" appeared in the Institute's Advanced Technology Program Rule published in June 1990.

As a result, we have begun to create the "shared vision" that we must have to attach the competitiveness problem with full vigor.

Action is replacing deliberation, and we find that NIST is fully committed to doing its part.

In closing, I thank you for the opportunity to express the Visiting Committee's views. I will be happy to answer any questions you have.

[The prepared statement of Dr. Bement, plus additional material follow:]

Statement of Dr. Arden L. Bement, Jr.
Chairman, Visiting Committee on Advanced Technology
of the National Institute of Standards and Technology
and Vice President of Science and Technology, TRW, Inc.
before the
Subcommittee on Science, Research, and Technology
Committee on Science, Space, and Technology
U.S. House of Representatives

February 26, 1991

Mr. Chairman and Members of the Committee:

I am pleased to appear before this Committee today as the Chairman of the Visiting Committee on Advanced Technology of the National Institute of Standards and Technology. As the Institute's principal private sector policy advisor, the Committee works closely with NIST's senior management, reviewing and making recommendations on the Institute's general policy, programs, organization, and budget.

Besides myself, the Committee includes eight other members with diverse backgrounds: Dr. William Howard, the Vice Chairman of the Committee and a Senior Fellow of the National Academy of Engineering; Dr. John Bollinger, Dean of Engineering at the University of Wisconsin; Dr. Jeanette Grasselli, Distinguished Visiting Professor and Director of Research Enhancement at Ohio University; Dr. Edward Heffron, Director of the Food Division of the Michigan Department of Agriculture; Dr. Robert Lucky, Executive Director of Research, Communications Sciences Division, AT&T Bell Laboratories; Dr. Richard Nicholson, Executive Officer of the American Association for the Advancement of Science; Prof. Nam Suh, Ralph and Eloise Cross Professor of Manufacturing and Mechanical Engineering at the Massachusetts Institute of Technology; and Dr. Albert Westwood, Vice President of Research and Technology, Martin Marietta Corporation.

We wish to note also the many contributions of Dr. William Slichter, a member of the Committee from 1988 until his death in October 1990. Before his retirement, Bill was Executive Director of Research in Materials Science and Engineering at Bell Laboratories. Bill served the National Institute of Standards and Technology over the last twenty-two years in several important advisory capacities, including a five-year term as Chairman of the Institute's Board on Assessment. His devotion to the Institute was extraordinary, and he is missed as a valuable counselor and a good friend.

Today, I will summarize the findings and recommendations of the Visiting Committee as an independent, private sector advisory body. I am also speaking from my perspective as Vice President of Science and Technology of TRW, Inc., and as a former researcher, teacher, and manager in industry, government, and academia during a thirty-five year career. My opinions on the federal government's role in promoting technological competitiveness draw on my earlier service as Deputy Under Secretary of Defense for Research and Advanced Technology, and as the Director of the Office of Materials Science at the Defense Advanced Research Projects Agency.

My testimony will follow closely the Visiting Committee's 1990 annual report, which the Secretary of Commerce recently sent to you, and which I submit as an attachment to my written statement.

Organization and Leadership

I want to begin by congratulating, on behalf of the Committee, NIST's new leadership on a successful first year. The new Director, John Lyons, and his management team have demonstrated genuine enthusiasm for the Institute's expanded industrial outreach activities. At the same time, Dr. Lyons, with his background in the NIST laboratories, brings with him a deep commitment to excellence in the Institute's research.

We are also delighted with the close working relationship developing between the Institute and the Technology Administration. Bob White, the new Under Secretary for Technology, is firmly behind the Institute and, as his statement makes clear, is increasing the Department of Commerce's visibility and stature in technical affairs.

Industrial Outreach Programs

Let me turn now to NIST's new industrial outreach programs. The Manufacturing Technology Centers (MTC) program, the first to get under way, has been in operation for just over two years. In our opinion, the program is off to a fine start. One measure of its performance, the return on investment, has been excellent. In the program's first 18 months, small companies said that they received about $75 million in economic benefits — from a federal outlay of about $9 million. Looking beyond the numbers, we think that the program is really helping small businesses to turn themselves around, and, in the process, it is teaching us what kinds of technological assistance they really need.

In September 1990, we issued a report on the MTC program after a year-long study. Copies of the report were sent through NIST to this Committee; I have also brought additional copies today. We visited each of the first three centers for a first-hand look; we talked to their managements and staffs, and to some of their small company clients. We came away impressed with the enthusiasm and capabilities of the centers, and the services they deliver to their clients.

These clients, our small businesses, are the backbone of the American industrial system. Roughly 350,000 in number, they supply our large companies, and their fortunes are linked together. Motorola, a first-year winner of the Malcolm Baldrige National Quality Award, has said emphatically that its product quality ultimately depends on what comes in the door from its suppliers.

Unfortunately, many of our small companies have been left behind by the rapid march of technology. However, we must not sell them short: the majority are clever and resourceful. If you give them access to the technology they need, and help them with training and implementation, they will know what to do from there. That's how the Manufacturing Technology Centers work, offering a helping hand; the enterprising firms will step forward to grasp it.

Another new outreach effort, the Institute's Advanced Technology Program (ATP), could become the primary government-industry joint venture to spur the commercialization of strategically-important technologies. During the program's first solicitation, industry responded with 249 proposals. The ATP managers tell us that industry was ready with more solid ideas than the program can support. We take that as a very promising sign for the future.

As the program gets under way, we have some recommendations. The first concerns program direction and philosophy. The Advanced Technology Program has a clear mission; it must stay focussed on those critical technologies that can improve U.S. industrial competitiveness. The second, no less important, concerns accountability: to be successful, the program must attract and fund ventures that will accelerate the development of new *commercial* products and processes. Ultimately, the Advanced Technology Program must lead to more than developmental advances.

To make a real difference in our competitive position, the ATP will also have to fund technology ventures with critical mass, that is, ventures that are large and ambitious enough to produce exciting technical gains. As the program grows, we would also like to see some funds invested in very high-risk, high-payoff ventures; that is, those that have the potential to open up "blockbuster" global markets for U.S. industry.

With the program's rapid growth, any recommendations on venture selection and program management aim at a moving target. Our Annual Report presents our thoughts on these subjects, with the understanding that we will continue to re-examine them with ATP management as time goes on.

Science and Engineering Research Programs

The Institute's science and engineering research programs are its technology drivers. They underpin the new industrial outreach programs and feed technology directly to industry through arrangements such as consortia and other partnerships with U.S. firms. Generally, the laboratories are in very good health from the standpoints of programs and performance. Their main problems over the last few years have been budgetary ones and, as I will discuss later, we are cautiously optimistic that better times are at hand. Research quality is high, and the research programs are in line with the Institute's mission.

In our visits to NIST, we have seen some new technology that is not only significant, but exciting. If you haven't done so recently, I encourage you to visit NIST and learn about its research first-hand. In my limited time this morning, I will try to capture the spirit of the laboratories by telling you about two of this year's noteworthy accomplishments.

In 1990, the laboratories excelled in the R&D 100 Awards competition, winning five awards and sharing two more with other organizations. I want to emphasize that these awards honor the 100 *most significant technical innovations that have highest commercial potential* each year. NIST's total of seven award winners tied for the highest obtained by any organization. Since entering the competition for the first time in 1973, NIST has won the award 71 times to rank third on the all-time winners' list, and first among federal laboratories.

The Institute's winning entries for 1990 are:

> An *information retrieval system* that is faster and easier to use for accessing information from large textual databases.
>
> A *Scanning Scattering Microscope* that produces three-dimensional-like images of surfaces at nanometer dimensions. One potential industrial application is measuring and imaging surface roughness of polished semi-conductor wafers for electronic devices.
>
> A *pulse-measurement instrument* that makes real-time measurements of rapid pulses in electrical insulators subjected to stress that can lead to electrical breakdown. The device can also be used to study other pulsating phenomena, such as the human heartbeat or pulses in fluids.
>
> A *novel method for growing single crystals* of proteins and other substances that will contribute to advances in drug design and protein engineering.
>
> A *real-time radiation dosage monitor* useful in quality control of widely-used industrial processes such as polymer curing and sterilization of medical instruments.
>
> *High-efficiency silicon photodiodes* with potential applications in sensors for industrial processes, detectors for imaging systems, and compact photometers for space and defense systems.
>
> *A cryogenic refrigerator* with no moving parts that has potential applications in cooling high-temperature superconducting devices and satellite-based detectors.

The Institute's proficiency in winning the award prompted us to ask NIST to document the actual commercial impact of its past and present R&D 100 awards. The story is an interesting one, which we plan to report in 1991.

This year, too, the Institute's Time and Frequency Division in Boulder, Colorado won the Secretary of Commerce's first Annual Quality Award. The Division maintains the nation's time standard and keeps the U.S. at the forefront of basic time-measurement research. Its reliable, high quality time services are indispensable for broadcasting and telecommunications, electrical power distribution, air traffic control, navigation, and other aspects of commerce where accurate timekeeping is essential. The Institute leads the way with a fine example as the Department of Commerce initiates its internal Total Quality Management system.

While I'm on the subject of Quality, let me turn to NIST's own Total Quality Management program. Total Quality Management (TQM) has been a continual theme in our meetings with the Institute this year. We are encouraging the Institute to make its new formal TQM program a cornerstone of its culture. To focus the program and increase its visibility, we recommend that NIST establish an Institute-level Quality Award to recognize excellence and to spur quality consciousness.

NIST's Industrial Relations Policies

As a result of legislation over the past several years, NIST has some powerful new ways to work with industry. The result has been that collaborations with industry are booming. The success of these collaborations depends upon externally-oriented industrial relations polices that promote strong working relationships. We attach great importance to such policies, because they are the very foundation on which all of the Institute's industrial collaborations are built.

In mid-1989, with our strong endorsement and support, the Institute began a thorough examination of its industrial relations policies. After careful consideration, the Institute adopted industrial relations policies that are, we believe, as clear and pro-active as any in the federal government.

Our Annual Report reviews the new policies. I will only mention here what we think are the three most significant aspects of them. First, the new policies balance NIST's role as a close research collaborator with individual companies/consortia with its role as an open and impartial technology resource for all U.S. companies. Second, they give clearer guidance on intellectual property arrangements in collaborations. In our opinion, this was perhaps the most significant part of the new policies, and should be a key that will help to open many more doors to prospective industrial partners. Third, the new policies include plans for an overhaul of the Institute's patent management system, to keep pace with a surge in patentable technology from its laboratories in the last few years.

While we congratulate NIST on a job well done, we hasten to add that the job is not yet complete. Now that NIST has adopted these new policies, it must implement them. We have recommended that NIST management give this task a high priority in the coming year.

NIST Budget

I would like to turn now to the Institute's budget. I am happy to report that the budget picture is brighter than it was when I testified before this Committee a year ago. The budget process, it appears to us, is beginning to catch up to the directives of the Omnibus Trade and Competitiveness Act of 1988. The 1991 budget allowed the new industrial outreach programs to move ahead and gave a much-needed shot in the arm to the laboratories. The President's 1992 budget, released since our Annual Report went to press, gives similar cause for optimism despite the fiscally-difficult times. As the Institute's budget picture has improved, we have turned our attention from the overall funding picture to budget priorities. This year, we commend two special budget issues to your attention.

To begin, I regret to report that the Institute's physical plant is seriously in need of upgrades and repairs. In several areas, NIST's facilities simply do not measure up to the demands of modern technical programs or, in some cases, do not comply with new safety and environmental requirements. I, and the other members of the Visiting Committee, have seen many of the Institute's facilities problems first-hand. We have described the problems in our Annual Report, and in even more detail in a special report on NIST Facilities released last July.

I won't beat around the bush: the problems are serious! They are going to cost a lot of money to fix, and the process will take several years. The $4 million in the President's 1992 budget earmarked for this purpose is a good start. While we recognize that fixing an aging physical plant may not be a glamorous issue, perhaps no other budget item is as important to the long-term well-being of the Institute.

The budget process can also help to ensure that the momentum of the Malcolm Baldrige National Quality Award program will be sustained. The program has rapidly become a focal point for the Total Quality movement in the United States. Its impact on U.S. industry extends far beyond rewarding our best firms: thousands of other companies are moving up the quality curve using the award criteria as self-assessment tools. Just last year, the program distributed over 180,000 sets of award guidelines. The award itself is becoming recognized worldwide as a symbol for the highest U.S. achievements in Total Quality Management.

The Baldrige Award program was started with an industrial endowment that was supposed to pay for operating the program. The problem, however, is that the nation's exploding demands for Quality leadership have quickly exceeded what the current income from that endowment can supply.

We propose a two-pronged solution. First, we think that federal support of the federal role in managing the Baldrige program represents, dollar-for-dollar, as worthwhile an investment as the federal government can make in the economic future of this country. At the same time, we believe that the program's Board of Overseers should explore ways to broaden the base of the program with increased private sector funding, which should always account for a substantial fraction of the program's total support. Our primary goal must be to ensure that the program, which has come to symbolize industrial quality in this country, will operate at the highest level of Quality itself, and will embrace the full range of U.S. manufacturing and service industries. Nothing less will do.

I will conclude my comments on the NIST budget with the Visiting Committee's endorsement of the laboratory research initiatives for 1992. NIST, as usual, has proposed an excellent slate of new and expanded research priorities:

> An initiative in *Electronics* will support the huge semiconductor manufacturing and magnetic recording industries, and will accelerate progress in the emerging field of superconductivity.
>
> The *Manufacturing Technology and Standards* initiative attacks manufacturing technology needs on a broad front. The initiative will develop technology for a new generation of "intelligent" machines and for digital exchange of product data, and will support industrial advances in materials processing and chemical measurements.
>
> The *Information Technology* initiative includes development of microwave and lightwave communications technology and assistance to industry in networking and implementing new digital information transfer networks. The Institute will also expand its work to prevent unauthorized access and disruption in electronic communications.
>
> The *Earthquake Hazard Reduction* initiative expands a program to improve standards and practices for seismic design and construction, a matter of increasing concern across the nation.

These initiatives meet clearly-identified national needs, they are consistent with the Institute's mission, and they were designed to use the Institute's special skills to full advantage. We recommend them to you highly.

NIST's Role in U.S. Industrial Competitiveness

My final subject this morning is the Institute's role in our national effort to improve our technological competitiveness. Concerned citizens in both the public and private sectors, including the members of your Committee, have given much thought to the federal government's support of science and technology in the interest of America's economic future. Many have called for clearer and more aggressive policies; some have proposed forming new agencies or re-shaping existing ones.

The Institute has been thinking about the future, too. NIST is deeply involved in developing a vision for the future, and a plan to meet new opportunities and challenges. In the process, they have looked to the experiences of other federal technical agencies such as the

National Institutes of Health (NIH) and DARPA. NIH has become the world leader in medical technology by combining a large internal research program with a large contract research effort. The internal and external programs complement each other superbly. DARPA, as has perhaps never been clearer, has done an outstanding job of maintaining the technology readiness of the U.S. military. We believe that NIST will be similarly pre-eminent in commercial technology if the federal government achieves the consensus and provides the resources necessary for that to happen.

In fact, I will go further: in the last few years, the National Institute of Standards and Technology, with its Advanced Technology Program, the Manufacturing Technology Centers, the Malcolm Baldrige National Quality Award, strong science and engineering research, and a host of other industry-oriented programs, has *already* become a focal point for federal efforts to raise our competitiveness. We believe that the Institute's arsenal of industry-oriented programs is unmatched anywhere.

I leave you, then, with this thought: as you continue to formulate civilian technology strategies, we urge you to recognize NIST's central role and use its capabilities. The most expeditious way to achieve our goal is to build on the foundation that has already been laid with your continuing support.

Some Final Thoughts

As I was preparing for this hearing, I re-read my testimony from last year to see what progress we have made in the intervening twelve months. In terms of fundamental change, that's not very long; however, the last year has been an active one.

The Institute's budget picture has improved, with funding increases balanced between technology development and technology transfer. As a result, there is less worry both inside and outside the Institute about the new outreach programs siphoning money from the laboratory programs. Looking down the road, we would like to see the laboratory and outreach programs become more integrated; the ultimate goal is a seamless transition from technology development to technology transfer.

With its programs in order, NIST has turned its attention to strategic planning. The Visiting Committee is consulting with NIST regularly in this exercise, to which we give the highest priority. We believe that an agency which has much to offer to the technical and economic vitality of the nation has never had more important work to do.

All of this fits with recent events on a larger scale. The Visiting Committee observes that the competitiveness debate is shifting from philosophy to practicality. As an example, the U.S. Technology Policy statement from the Office of Science and Technology Policy recently recognized the legitimate role of the federal government in generic, enabling technology development in the precompetitive phase. (We point out that the first written definitions of the terms "generic technology" and "precompetitive technology" appeared in the Institute's Advanced Technology Program Rule published in June 1990.) As a result, we have begun to create the "shared vision" that we must have to attack the competitiveness problem with full vigor. Action is replacing deliberation, and we find that NIST is fully committed to doing its part.

In closing, I thank you for the opportunity to express the Visiting Committee's views. I will be happy to answer any questions you have.

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ANNUAL REPORT

1990

VISITING COMMITTEE ON ADVANCED TECHNOLOGY
NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY

JANUARY 1991

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FOREWORD

This year's Annual Report features the principal programs and issues that we studied in 1990. We have spent much of our time on NIST's new industrial outreach programs, for which policies and procedures are being developed. However, we continue to place emphasis on the Institute's science and engineering research programs because they are fundamental to the Institute's existence. As NIST moves more aggressively into technology transfer, the laboratory programs that develop technology and create unifying standards become ever more important.

In our oversight and advisory activities, we have met with a broad cross section of NIST management and staff. We are grateful for their excellent cooperation. In particular, we thank the NIST Director and his staff, the Executive Board, the Program and Budget offices, and the many others who responded to requests for information, made presentations at our meetings, allowed us to tour their laboratories, and otherwise contributed to the success of our meetings and our work. We especially acknowledge the valuable reports on the "health," accomplishments, capabilities, and needs of the Institute's research programs from the Board on Assessment of NIST Programs, which is operated by the National Research Council.

Finally, we note with sadness the death of Dr. William P. Slichter, a member of the Visiting Committee on Advanced Technology from 1988 until his death on October 25, 1990. We have lost a good friend and valuable member, and the Institute has lost a staunch supporter. From 1968 until 1988, Bill served NIST with distinction in several other capacities, including Chairman of the Board on Assessment (1983-1988). Bill's voluntary service to the Institute was extraordinary, and he will be sorely missed.

The Visiting Committee on Advanced Technology

January 1991

THE VISITING COMMITTEE ON ADVANCED TECHNOLOGY

1990

Arden L. Bement, Chairman
Vice President, Science and Technology, TRW, Inc.

William G. Howard, Vice Chairman
National Academy of Engineering

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William P. Slichter (deceased)
AT&T Bell Laboratories

Nam P. Suh
Ralph E. & Eloise F. Cross Professor of Manufacturing
and Professor of Mechanical Engineering
Massachusetts Institute of Technology

Albert R. C. Westwood
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EXECUTIVE SUMMARY

The Visiting Committee on Advanced Technology, as principal private sector advisor to the National Institute of Standards and Technology (NIST), reviews and makes recommendations regarding the general policy, organization, budget, and programs of the Institute. Each year, the Committee submits an Annual Report to the Secretary of Commerce. The principal findings and recommendations of our full report are summarized here.

Programs

The Institute's new industrial outreach programs are now all under way. The *Manufacturing Technology Centers* (MTC) program, which helps small businesses to adopt advanced manufacturing technologies, has now been in operation for two years. After reviewing the program and visiting the first three centers, we concluded that the program has become a valuable technological resource for small companies and is increasing our understanding of the technology needs of small companies and how to meet them.

As the program matures, it should undertake projects with broader utility and extend its leverage by working through small business and technology transfer networks. In addition, the centers should make a particular effort to teach the concept of Total Quality to their clients.

The MTC program should remain an incubator, providing start-up funding for centers which will become self-supporting. If the program continues to meet its goals, we recommend expanding it to incubate about 12 centers at a time, working toward a network of centers which serve as nodes in the nation's competitiveness effort.

The *Advanced Technology Program* (ATP), which held its first proposal solicitation this year, will help industry to develop and apply generic technology needed to commercialize new products and manufacturing processes. We believe that the program's success will depend on its ability to attract and fund proposals in strategically-important technologies with high commercial potential.

Regarding the program's operation, we believe that industry's input into defining technological targets is essential, and should be built into ATP proposal solicitations. Program procedures should be designed to remove legal obstacles and provide incentives to encourage industries to work together in planning and forming ATP ventures. We also believe that NIST should be a full technical participant in ventures when a technical match exists. As the program grows, some broader, higher-risk ventures with greater potential payoffs should be included in its portfolio.

The *laboratory science and engineering programs* made noteworthy contributions to fundamental science, applied technology, and the national welfare. Of particular note, the Institute won seven *R&D 100 Awards*, which recognize each year the 100 most significant technical innovations with commercial potential. NIST has won the award 71 times since 1973, an extraordinary record. We will report in 1991 on the commercial impacts of NIST's awards. Also, the Institute's Time and Frequency Division was honored as the first recipient of the *Secretary of Commerce's Quality Award* for its superb time services to the nation and time measurement research.

The Institute recently began a formal *Total Quality Management Program*. We have recommended that the Institute establish its own Quality Award as part of the program, to recognize excellence and to spur quality-consciousness.

Industrial Relations Policies

Industrial relations policies are the foundation on which NIST builds its industrial partnerships. To exploit opportunities for industrial partnerships fully, the Institute has developed new policies which we believe are as clear and pro-active as any within the federal government. The policies balance the Institute's growing role as a close research collaborator with individual companies and consortia with its traditional role as a technology resource for the nation. A most important aspect of the policies, in our opinion, is clearer guidance on intellectual property arrangements in collaborations, a matter of considerable importance to the Institute's industrial partners.

We strongly endorse the new policies, and expect NIST to move vigorously to implement them. In addition, the Institute plans to revise its patent management system to provide higher quality, more timely service. We have recommended that NIST management give these tasks a high priority in the coming year.

The NIST Budget

The Institute's budget position has improved substantially with the 1991 appropriation and the 1992 budget in progress. The budget process has begun to respond to NIST's increased role in promoting industrial competitiveness. We recommend two budget items for special consideration in 1992: *improvements to the Institute's facilities* and *additional staff for the Malcolm Baldrige National Quality Award program*.

Perhaps no other budget item is as important to the long-term well-being of the Institute as rehabilitation and repair of its physical plant. The Institute's facilities problems include technical obsolescence of some laboratories, safety deficiencies, and inadequate utilities. To address these problems, the Institute has developed a comprehensive, multi-year plan for the $54 million of needed repairs. We strongly support that plan and the facilities budget initiative in the 1992 Department of Commerce budget request.

The Malcolm Baldrige National Quality Award program has rapidly become the focal point of the U.S. Quality movement. As the program's scope and influence have grown during the last three years, the industrial endowment that was established to pay for the program has become inadequate. As a result, we endorse the appropriation of funds to alleviate a critical staff shortage. We also encourage the Baldrige Award program's Board of Overseers to explore ways to increase private sector support, which we think should grow as the program grows.

Organization

The Institute's new Director and management team have had a very successful first year as the Institute prepares for a time of challenge and opportunity. We believe that the new, flatter organization they have proposed will be more responsive and efficient. NIST is already studying further changes which may be needed if the industrial outreach programs grow as expected. To anticipate and manage these changes, we believe that a new strategic plan is needed, and we are now consulting with NIST on the development of such a plan.

COMMITTEE CHARTER AND 1990 ACTIVITIES

The Visiting Committee on Advanced Technology of the National Institute of Standards and Technology (NIST) was established by the Omnibus Trade and Competitiveness Act of 1988. The Trade Act gives the Committee the responsibility to review and make recommendations regarding the general policy, organization, budget, and programs of the Institute. The Committee holds four business meetings each year with NIST management, and schedules additional meetings as necessary with senior officials from NIST and the Department of Commerce on specific subjects. This year, the Committee held three such meetings with senior Department officials and made fact-finding visits to each of the three centers in the Manufacturing Technology Centers Program.

The Committee summarizes its findings each year in an annual report which is presented to the Secretary of Commerce for submission to Congress. The report addresses issues that affect the Institute or are of concern to the Committee in its role as the private sector policy advisor of NIST. The report also reviews progress in the Institute's science, engineering, and technology transfer programs, particularly those in which the Institute has special competence that can help to improve long-term competitiveness of U.S. industry. The Committee prepares reports on specific policy matters as it deems appropriate.

A summary of the Visiting Committee's meetings, reports, and other activities for Fiscal Year 1990 is given in Appendix A. The Appendix also provides the address from which Visiting Committee reports can be obtained.

NIST PROGRAMS

INDUSTRIAL OUTREACH

Three new industrial outreach programs created by the Omnibus Trade and Competitiveness Act of 1988 are now under way. The Manufacturing Technology Centers (MTC) program, in its second year of operation, has already become a valuable technological resource to small companies. The Advanced Technology Program (ATP), expected to be the largest of the new outreach programs, and the Boehlert-Rockefeller Technology Extension Program began operation this year. Our findings, recommendations, and comments on these three programs follow.

Manufacturing Technology Centers Program

The Manufacturing Technology Centers (MTC) program helps the nation's small and mid-sized businesses adopt advanced manufacturing technologies to improve their productivity and performance. The program thus provides assistance to a hard-to-reach sector of industry in which technological advances are much needed. Regional centers serve as technology transfer agents following the conceptual model shown in Figure 1.

The Visiting Committee has monitored the MTC program closely since the first three centers (in Cleveland, Ohio; Troy, New York; and Columbia, South Carolina) began operation in January 1989. In 1990, we conducted a study to determine whether the program is achieving its stated goal of helping small and mid-sized businesses to become more technologically competitive, and is providing a useful blueprint for industry-government cooperation. Our study included visits to all three MTCs in June 1990. Each visit included meetings with center clients as well as center management and staff. We also reviewed the enabling legislation, center progress reports, comments by the National Society of Professional Engineers, and the National Research Council's reviews of the first group of center proposals.

We concluded that the MTC program has made an impressive start; centers have developed a variety of technology services and provided substantial technological and economic benefits to small firms in their regions. Indeed,

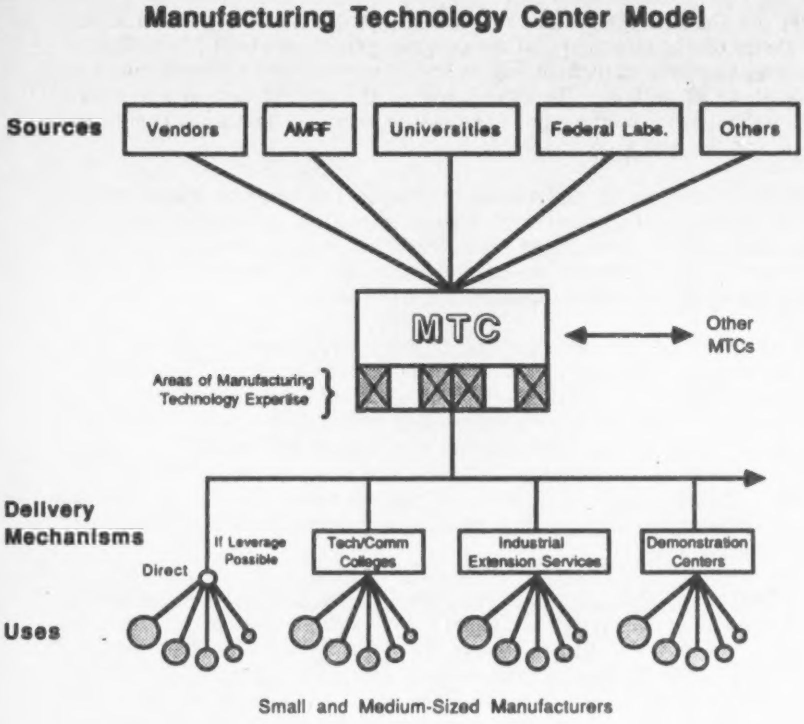
Manufacturing Technology Center Model
Sources
Vendors
AMRF
Universities
Federal Labs.
Others
MTC
Other MTCs
Areas of Manufacturing Technology Expertise
Delivery Mechanisms
Direct
If Leverage Possible
Tech/Comm Colleges
Industrial Extension Services
Demonstration Centers
Uses
Small and Medium-Sized Manufacturers

Figure 1. The Manufacturing Technology Center model. The center is the focal point for technology transfer from sources of technology to small companies. (reprinted from "The Manufacturing Technology Centers Program," the Visiting Committee on Advanced Technology, October 1990.)

after our October 1990 report on the MTC program was in press, a survey of center clients indicated that the program generated about $75 million in economic benefits to them during its first 18 months, with a federal outlay of only about $9 million. The experiences of the centers have also provided invaluable lessons on the type of technology assistance that small companies need and the best ways to provide it.

The MTC program is, and should remain, an incubator to create centers which become self-supporting after six years. If the program continues to meet its goals, we recommend expanding it to incubate about 12 centers at a time, working toward an operationally and technically diverse and geographically balanced national network of centers.

By geographical balance, we mean more than regional parity: the Manufacturing Technology Centers should be nodes in the national effort to improve manufacturing technology. These nodes must be placed where they will be most effective. We emphasize that MTCs should be awarded solely on merit, taking into account technical competence, business plans, financial commitments, and integration into local and state industrial development plans. Therefore, a crucial task is helping all states and regions, not just those traditionally strong technologically, to become capable of competing for MTCs.

The Technology Administration can contribute by helping states to develop and implement technology strategies. We suggest that this job may be appropriate for the Clearinghouse for State and Local Initiatives on Productivity, Technology, and Innovation, which already carries out related functions. The success of South Carolina in building its Manufacturing Technology Center is a fine example of what an ambitious state committed to improving its technological position can accomplish.

Our detailed findings and recommendations on the MTC program were summarized in a report to the Secretary of Commerce in October 1990. The report reviews the status of the MTC program and discusses its role in enhancing U.S. industrial competitiveness. The technology transfer services developed by the centers, which are the heart of the MTC program, are described and discussed. The report also contains a number of recommendations on program strategies, operations, and financial support. Appendices give short profiles of the centers, including brief descriptions of their operations, their clienteles, and their funding status, as well as accounts of successful technology transfers.

The Executive Summary of our report on the Manufacturing Technology Centers program is included here as Appendix B. We encourage those interested in the MTC program to obtain a copy of our full report.

The Advanced Technology Program

The Advanced Technology Program was created to help U.S. business develop and apply generic technology needed to commercialize new technologies rapidly and to improve manufacturing processes. The program funds joint industrial research and development ventures such as consortia as well as contracts and cooperative agreements between government and industry. (The term "venture" below refers to the full range of possible arrangements.)

The Advanced Technology Program is the first federal program designed explicitly to support precompetitive research on generic technologies to improve U.S. industrial competitiveness. In fact, the ATP rule published in June 1990 included the first definitions by the federal government of the terms "precompetitive research" and "generic technology." Because we believe that those terms are central to defining the federal government's role in working with industry, we restate the definitions here:

> *Precompetitive research* includes research and development activities up to the stage at which technical uncertainties are sufficiently identified to permit assessment of commercial potential, and prior to development of application-specific commercial prototypes.
>
> *Generic technology* means a concept, component, or process, or the further investigation of scientific phenomena, which has the potential to be applied to a broad range of products or processes.

Federal participation with the private sector in precompetitive research on generic, enabling technologies was subsequently incorporated into a formal statement of U.S. Technology Policy by the Office of Science and Technology Policy in September 1990.

In March 1990, the Visiting Committee met at the request of the Department of Commerce to provide advice on implementing the Advanced Technology Program. A written report containing our recommendations was submitted to the Department in April 1990. Our principal recommendations are summarized in this section.

Venture Selection Criteria

The Advanced Technology Program will be successful to the extent that it creates new products and manufacturing processes that improve our ability to compete in the world economy. Thus, the main criteria for selecting technologies for ATP ventures should be their strategic importance to U.S. industrial competitiveness and industry's interest in them as *commercial* opportunities.

The business community is primarily responsible for identifying technologies with a high potential return. Thus, the Department of Commerce should seek broad industrial participation in ATP technology selection. The Department can, for example:

- hold public hearings and workshops around the country to provide greater access to small companies, nonprofit institutions, and regional and state associations.
- work with industrial networks such as the Industrial Research Institute and the National Association of Manufacturers to publicize the ATP and establish program priorities.
- form private sector committees to advise the ATP on strategies and to evaluate the progress of individual joint ventures.

The process for selecting ATP ventures, discussed in the next section, should also be designed to encourage industrial input.

In its early years, the Advanced Technology Program must develop a track record and build broad support. Thus, the program must consider whether proposed ventures have the potential to make tangible, significant progress toward commercialization within one to two years.

Participants for ATP ventures must be willing to commit as full partners in ventures, participating in program management as well as research and development (with exceptions for small companies with limited resources). They must also demonstrate the intent and means to commercialize technology that will produce products and processes that will strengthen the domestic economy.

The Selection Process

The ATP venture selection process we recommended was designed to (a) ensure broad industrial input in identifying critical technologies; (b) add value during the process, to benefit the program and the respondents; and (c) reduce the burden of reviewing full proposals, especially those that do not meet the main criteria of the program. The process contained three steps:

- a first round "discovery" phase to obtain industry's counsel on where selective investments under the ATP can be most effective. Short, streamlined proposals would allow small businesses and other organizations with limited resources to participate. During the first round, proposals with inappropriate subjects or violations of ATP rules could be identified before full proposals were submitted; this would allow proposers to modify their proposals or to withdraw before full proposals were prepared.

- an opportunity to add value after the first round by: (a) narrowing the focus of the second round based on private sector responses in the first round; (b) providing feedback to first-round respondents; (c) promoting interactions among first-round respondents with similar interests; and (d) deciding when planning grants are needed to assess specific technologies.

- a second round of comprehensive proposals, including detailed statements of technical work for peer review and plans for managing and operating the ventures. Because of the tighter focus of the second round, fewer detailed reviews would be necessary than if a single-round, unrestricted solicitation were made.

The Institute received 249 proposals in response to the first solicitation. This level of industry response is significantly greater than anticipated. While the above selection procedure was overruled by policy considerations, we continue to recommend it. The ATP program managers should continue to refine the solicitation process based on operating experience. This will be particularly important as the number, size, and scope of the proposals increase. Without streamlining, the solicitation process could become unmanageable.

Program Management

The Advanced Technology Program, especially in its early years, should be in part a laboratory for developing government-industry collaborations that work within our economic and political systems. A pragmatic, flexible approach is needed to develop ventures around the technological strengths and business goals of the partners. The program should encourage managerial and technical innovation by giving each venture as much operating freedom as possible.

To provide each venture with a critical mass of resources and technical talent, we recommended that the ATP should focus on no more than three to five key technology areas while the program is funded at the $10 million level. We doubt that many unrelated, small programs can significantly improve U.S. competitiveness. The initial group of proposals, however, requested an average of about $500,000 in first-year funding. The relatively-small size of the proposals reflects the fact that most were from individual companies, which are prohibited by legislation from receiving more than $2 million over three years; also, proposals may have been tailored to the total funds available. Because there are indications that the ATP will grow rapidly, NIST should plan for the transition to ventures with greater size and scope, including some with higher risk and correspondingly greater potential return.

The Institute's main roles in the ATP are to bring together industrial firms to achieve "critical mass" to launch new technologies, and to provide them with technical support and guidance. We believe that the Institute should be a full partner in ATP ventures when it has generic, precompetitive technology that can contribute directly to the development of new commercial products and processes. NIST's active participation in ventures will lend technical credibility to the program and make the ATP a true government-industry partnership, not merely a government grants program.

Assignment of Intellectual Property Rights

The primary goal of ATP intellectual property policies should be to provide maximum benefit to the nation. Within that context, the proprietary positions of the partners must be protected to plan and establish strong ventures. The Department of Commerce can provide incentives by:

- seeking class waivers that allow companies to work together to plan consortia and other joint ventures without antitrust prosecution.

- allowing each venture to negotiate agreements that reflect its unique business environment as well as the competitive positions and strategies of the private sector partners.

- giving partners an initial period of exclusivity, negotiated on a venture-by-venture basis, to practice the technology developed by the venture.

Future Visiting Committee Reviews

The ATP is poised for increased activity in 1991, as the first ventures are selected and begin operation and the second proposal solicitation is held. In accordance with our oversight role for the program, assigned by the Trade Act, we will meet regularly with ATP management for program reviews. We intend to report on the program again after the first ventures have made significant technical progress.

Boehlert-Rockefeller Technology Extension Program

The Boehlert-Rockefeller Technology Extension Program awarded its first nine grants in August 1990. The program assists states in establishing and enhancing their technology extension activities and funds state efforts to transfer federal technology to private industry. In some respects, the Technology Extension Program is a complement to the Institute's Manufacturing Technology Centers program. In fact, three of the first nine Technology Extension activities (in Massachusetts, New York, and Pennsylvania) are directly linked to Manufacturing Technology Centers, which should make both programs more effective.

The two programs are similar in concept to the agricultural extension network, which has helped American agriculture to become the most productive in the world. The first group of Technology Extension activities and the Institute's Manufacturing Technology Centers will give some indication of whether a similar approach can work in industrial technology.

The modest ($0.9M this year) yet diverse Technology Extension Services program relies on the states to identify federal technology that will be useful to their industries. To be successful, the program must develop the "market pull" needed to complement the "technology push" that the federal laboratories can provide. The nine state activities propose many approaches to transferring technology; a common theme in several of them is formation of linkages among universities, state technical and industrial development agencies, technology transfer organizations, and federal laboratories. We plan to review these activities after their first year of operation.

LABORATORY SCIENCE AND ENGINEERING

The Institute's laboratory research programs made impressive contributions to fundamental science, applied technology and the national welfare in 1990. The laboratory highlights are, as in previous years, very diverse; we present the following small sample to illustrate the breadth and importance of the Institute's laboratory programs. In 1990, NIST:

- completed experiments that put to rest an international scientific debate over the existence of a new "fifth force" (the Institute's highly-exacting measurements found no evidence to support it).

- established new antenna measurement services at millimeter wave frequencies that will help industry to develop commercial applications such as collision-avoidance radar and personal communications systems.

- dedicated world-class laboratory facilities for multidisciplinary studies of protein structure, function, and design at the Center for Advanced Research in Biotechnology (CARB), a cooperative venture of NIST, the University of Maryland, and Montgomery County, Maryland.

- completed a study of the Loma Prieta earthquake which supported the need for earthquake safety assessments of structures located on deep, unstable soil and for improved design and retrofit practices for "lifelines" such as bridges, highways, and gas pipelines.

- increased the number of Cooperative Research and Development Agreements (CRDAs) from 44 in 1989 to 81 in 1990; a CRDA is a specific type of partnership designed to attract industrial collaborators by offering flexible intellectual property arrangements.

A complete account of the Institute's laboratory science and engineering achievements during 1990 is outside the scope of this report. (Our 1989 report, *Technology for U.S. Industry*, describes several of NIST's technical accomplishments in recent years and their benefits to the U.S. economy.) This year, we focus on two noteworthy achievements: the Institute's outstanding performance in the 1990 R&D 100 Awards, and the selection of one of the Institute's research divisions as the first recipient of the Department of Commerce Quality Award.

1990 R&D 100 Awards

In 1990 the Institute won five R&D 100 Awards and shared two more awards with other organizations. The total of seven award winners was the highest obtained by any organization. The R&D 100 Award honors the 100 most significant technical innovations with commercial potential each year. The annual winners are selected on the basis of their importance, uniqueness, and usefulness from a technical standpoint. Since entering the competition for the first time in 1973, NIST has won the award 71 times.

The Institute's winning entries for 1990 are:

> Information Retrieval System: a fast, easy-to-use system to retrieve information from databases that contain large amounts of text, including books, bibliographies, and directories. The system uses simple sentences or phrases to query databases and can return records significantly faster than other systems. The new system can also be used with little or no training, and arranges retrieved records in order of their relevance.
>
> Scanning Scattering Microscope: an optical technique for imaging the surface microstructure of materials. The technique can produce three-dimensional-like micrographs of surfaces at nanometer dimensions. Because the instrument is a non-contacting probe, it can be used in monitoring and controlling the fabrication of surfaces during processing. Potential industrial applications include measuring and imaging surface roughness of polished semi-conductor wafers, detecting defects in surfaces, and monitoring the effects of surface abrasion.
>
> Stochastic Analyzer for Pulsating Phenomena: an instrument that makes real time measurements of rapid pulses which can occur when insulating materials in electrical systems are subjected to stress. These pulses can produce material degradation that leads to electrical breakdown in the system. The NIST device can be used to study the underlying physics and to develop a better understanding of insulator performance. In addition, it can be used to investigate other pulsating phenomena, such as the human heartbeat or pulses in fluids.

Crystal Growth by Osmotic Dewatering: a novel method for growing single crystals of proteins and other substances. The process uses osmotic pressure difference to remove water from a solution, resulting in crystal growth. The process is a versatile way of growing large, defect-free single crystals in a controlled environment. The availability of a reliable crystal growth technique will contribute to advances in drug design and protein engineering.

Laser Telemetering Dosimetry System: a real-time system to monitor radiation dosage. Applications include quality control in widely-used industrial processes such as polymer curing and sterilization of medical instruments. The NIST measurement system is ideal for industrial and field work because it does not require ionization chambers and delicate laboratory instruments.

The following awards were shared by NIST and other organizations:

High Efficiency Silicon Photodiodes: devices for use as high-sensitivity radiometric standards, compact photometers for space and defense applications, detector elements for imaging systems, and inexpensive remote sensors for industrial processes. The Institute shared the award with UKDT Sensors Inc.

Cryogenic Refrigerator: "Coolahoop," a refrigerator with no moving parts which thus does not require periodic maintenance due to wear of parts and has no apparent lifetime-limiting feature. Potential applications include cooling for high-temperature superconducting devices and for satellite-based detectors used for climate monitoring and resource surveying. NIST shared the award with Los Alamos National Laboratory.

An R&D 100 Award is a unique recognition of new technology with technical merit as well as commercial potential. The Institute's extraordinary success in winning numerous awards has prompted us to begin a study of NIST's past and present R&D 100 awards and their actual industrial impact. We plan to issue a report on that subject in 1991.

Recognition for Quality Performance

Total Quality Management (TQM) has been a continual theme in our meetings with the Institute. We believe that NIST has an important role in providing TQM leadership among the federal laboratories. This role is consistent with the Institute's mission, and follows from a tradition of discipline and excellence.

This year, one of the Institute's research programs was singled out for special recognition when the Time and Frequency Division in Boulder, Colorado was named the first winner of the Secretary of Commerce's Annual Quality Award. We congratulate the 44 members of the Division on a well-deserved honor. The Division has done an outstanding job of maintaining the nation's time standard and keeping the U.S. at the forefront of basic time-measurement research. In addition, the Division has provided reliable, high quality time services to the public for many years via short wave radio and satellite. These time services are indispensable for air traffic control, navigation, broadcasting and telecommunications, electrical power distribution, and many other aspects of commerce.

The Time and Frequency Division has also been innovative in improving its time services and in helping industry to develop practical applications for them. In our 1989 Annual Report, for example, we highlighted the development of a system for reducing traffic congestion in Los Angeles that synchronizes traffic lights to NIST's standard frequency broadcasts. The Time and Frequency Division provided technical assistance to industry in developing special receivers tuned to the NIST signal that makes the system possible.

The Los Angeles system is expected to save 22 million gallons of gasoline and reduce exhaust emissions by over 6000 tons per year, and will save 55,000 hours of work time now lost in traffic jams each day, when fully operational. The State of California is now studying the system for application elsewhere. The traffic regulation system illustrates how a seemingly-arcane technical service can improve the quality of life substantially.

It is appropriate for the Institute, which has earned a reputation for excellence, to lead the way as the Department of Commerce initiates its internal Total Quality Management system. The Director of the Institute described to us this year his current efforts and future plans to expand Total Quality Management at NIST. We believe that his direct and visible leadership has been crucial in getting the TQM program underway, and must continue in order to establish Total Quality Management as a cornerstone of NIST's operations. We have recommended that NIST establish an Institute Quality Award, patterned on the Secretary's Award, to recognize excellence within NIST and to spur quality-consciousness.

NIST INDUSTRIAL RELATIONS POLICIES

Industrial relations policies are the foundation on which the Institute's industrial partnerships are built. With the Omnibus Trade and Competitiveness Act of 1988 and other recent legislation, NIST gained new opportunities for working with industry. To exploit these opportunities fully, NIST must have policies that provide incentives to industry, remove intellectual property and other barriers to partnerships, and define the rights and responsibilities of the Institute and its collaborators.

Accordingly, the Institute formed an Industrial Relations Working Group in 1989 to study and recommend industrial interactions policies to senior management. The Institute subsequently adopted comprehensive policies based on the recommendations, and discussed them with the Visiting Committee in September 1990.

We believe that the Institute's new policies are as clear and pro-active as any within the federal government. The primary goal of the policies is to foster productive partnerships with industry. The policies also strive for balance between the Institute's roles as an open and impartial technology resource for the nation and as a close research collaborator with individual companies and groups of companies.

Because of the great importance of NIST's new policies in facilitating industrial interactions, we summarize and comment on some of the principal policies below.

COOPERATIVE ARRANGEMENTS WITH INDUSTRY

Under its new policies, NIST will continue to support and cooperate actively with industry in mission-related activities. When NIST has facilities or equipment that are not available in the private sector, it will make them available for use by outside individuals on a cost-reimbursable basis.

NIST has decided, and we concur, that the laboratory (major technical unit) directors are the proper decision points within the Institute for overseeing most collaborative activities. At that level, detailed knowledge of Institute-level policy and specific technologies come together. Accordingly, NIST has given laboratory directors the authority to enter into cooperative agreements with industry and to decide when cooperative activities between NIST and individual industrial collaborators require formal written agreements and legal review.

To ensure fairness and openness in choosing industrial collaborators, the Institute will:

- document that each cooperative agreement is mission-related and that the industry partner(s) is appropriate for the agreed-upon work.

While the Institute must remain a technical resource for all U.S. companies, certain aspects of its mission require close working relationships with individual companies. To provide the proper balance between these dual roles, the Institute has set clear limits on its participation in proprietary research. The Institute has decided to:

- enter into research agreements in which the research results will be exclusively owned by the firm that pays for the research only through formal Cooperative Research and Development Agreements (CRDAs) or by prior approval of the NIST Director.

TREATMENT OF INTELLECTUAL PROPERTY

NIST is an important source of pre-competitive technology, including technology that helps to advance products and processes toward commercial application. To promote broad access to its technology, the Institute will, as it has in the past, emphasize dissemination of research results through publication. In the same spirit, NIST will make freely available to the public any NIST "know-how" developed as part of official duties. Thus, licensing of NIST "know-how" or using it in consulting for private gain is prohibited. In our opinion, all of these information dissemination policies, which carry over from the past, are important aspects of the Institute's role as a national technological resource.

At the same time, NIST has become more aggressive in seeking patent protection for its commercially-valuable technology as formal industrial interactions have expanded (the annual number of patent disclosures has almost doubled in the last three years). The Institute recognizes that sometimes the best way to promote commercialization is to offer industry a proprietary position as an incentive to continue development. Accordingly, NIST will:

- institute a patent management program that ensures timeliness and quality in filing invention disclosures and patent applications (the Institute is studying a number of options for its patent management program) and ensures that NIST staff know their responsibilities under the program.

- patent or otherwise protect NIST technology when appropriate to preserve the federal government's rights and to facilitate commercialization.

The Institute will also take appropriate steps to maximize the value of joint ventures to its industrial partners. For example, NIST will:

- delay public disclosure of research results when necessary to allow for filing patents or in certain other specified cases.

- negotiate licensing terms on NIST technology that offer industry incentive to invest in further development and commercialization, while preserving the value of the property through a return of royalties to NIST and to the inventor(s).

- protect proprietary information of collaborators under certain circumstances when necessary for industrial collaborations.

  One aspect of this last policy would allow NIST staff, under some conditions, to sign nondisclosure agreements without legal or managerial review, for the purpose of exchanging information with industrial colleagues. However, we believe that the knowledge of legal issues required may be well beyond that of the average researcher. Thus, we recommend that this policy be reviewed periodically and modified if problems arise.

RIGHTS AND RESPONSIBILITIES OF NIST EMPLOYEES IN INDUSTRIAL INTERACTIONS

Intense industrial collaborations and new employee invention rights increase conflict of interest issues for the NIST scientist. As federal employees, NIST scientists and engineers are barred from personal, substantial participation in matters in which they have financial interests. Thus, they are not allowed to conduct research that might increase the value of patents they own, including patents assigned to them by the Institute.

The new policies address two concerns. First, the Institute can not afford to lose the services of researchers in their areas of expertise by having to stop research involving a conflict of interest. Second, NIST's industrial interactions must conform to its overall standard of conduct, in which employees do not use federal employment for personal gain.

Accordingly, the Institute will:

- **patent its inventions with commercial value, or attempt to commercialize them through partnering with industry (if these steps are not taken, the Institute must by law grant title of the invention to the inventor).**

- **recommend to the Department of Commerce that rights to NIST inventions not be returned to staff inventors.**

- **require employees to notify their supervisors when they have a financial or employment interest with a prospective industry partner.**

FURTHER INDUSTRIAL INTERACTIONS POLICY DEVELOPMENT

The policies outlined in the preceding three sections are certain to increase NIST's value as a partner to industry. We commend the Institute for a most significant accomplishment which promises great future dividends. However, we see a need for continued progress in three areas:

- NIST must make the new policies a part of its culture.

  Hundreds of managers and staff must be educated on the new policies, and a system of controls must be put in place to ensure that they are used. NIST must also spread the word to industry that its new policies will facilitate collaborations to develop commercially-applicable technology.

- NIST's new patent management program must be defined and put into operation.

  The Institute must decide how much patent filing and patent portfolio management work it will do in-house, and which operations should be performed elsewhere. The Institute must also be certain that its managers and research staff understand the importance of filing invention disclosures and the role that patents play in commercializing technology.

- NIST must develop policies and procedures for employee conflict of interest problems.

  Such problems may arise despite the Institute's best efforts to prevent them. The Institute should work with the Department of Commerce General Counsel's office to identify a reviewing authority and develop procedures that assure due process.

We recommend that NIST management assign specific responsibility for these tasks and give them a high priority, because formal and informal working partnerships with industry continue to develop at a rapid pace.

THE NIST BUDGET

The Institute's budget position has improved significantly with the 1991 appropriation, and the 1992 budget in progress gives similar cause for optimism. In 1988, the Trade Act called upon the Institute to broaden and intensify its efforts to spur industrial competitiveness. With the 1991 appropriation, the budget process has begun to respond.

The 1991 appropriation provides funding for an impressive array of laboratory research initiatives as well as growth for the Advanced Technology Program and the Manufacturing Technology Centers program. We believe that a balanced distribution of funding increases between research and outreach programs should continue to be the goal for future years.

For 1992, NIST proposes science and engineering research initiatives that will begin or expand research in several strategically-important technologies. We endorse all of those initiatives, which are as follows:

- An initiative in *Electronics* will support the huge semiconductor manufacturing and magnetic recording industries, and will accelerate progress in the emerging fields of superconductivity and lightwave technology. In addition, research in atomic-scale electronics will add to the science base necessary to reach the ultimate in device performance.

- The Institute's largest initiative, in *Manufacturing Technology and Standards,* attacks manufacturing technology needs on a broad front. The initiative will develop technology for a new generation of "intelligent" machines and for digital transmission of product data. Additional research will support advances in materials processing, bioprocess engineering, and chemical measurements and standards.

- The *Information Technology* initiative includes development of microwave communications technology and assistance to industry in networking and implementing new digital information transfer methods. The Institute will also expand its efforts to prevent unauthorized access and disruption in electronic communications, including its crucial role in reviewing and making recommendations on the computer security plans for thousands of federal agencies.

- **The Institute also proposes two smaller initiatives in *Public Safety* and *Public Health*. The Public Safety initiative is focussed specifically on earthquake hazard reduction, a matter of increasing concern across the nation. The Public Health initiative will provide technical support of U.S. industry's drive to replace chlorofluorocarbons in refrigeration and air conditioning systems, while maintaining the performance necessary to remain a leader in those businesses.**

This year, we gave particular attention to two additional budget issues which we believe must be addressed in the short term. These two budget issues are discussed below.

REPAIR AND UPGRADE OF NIST FACILITIES

After studying the condition of the Institute's physical plant during the past year, we have concluded that rehabilitation and repair are urgently needed and will require budgetary action. Perhaps no other budget item is as important to the long-term well-being of the Institute.

In a written report in July 1990, we identified three principal facilities deficiencies:

- Technical Obsolescence

  Science and technology have made enormous strides since the Institute's laboratories were constructed. As a result, NIST's physical plant is often unable to meet the demands of today's research.

  Because the Institute is expected to be a leader in highly-sophisticated measurements, it requires laboratories with high-quality, stable electrical power and exacting control over temperature, humidity, air cleanliness, and vibration. At present, inadequate control of the laboratory environment hinders important research programs as well as measurements for industry.

- Safety and Environmental Problems

  NIST maintains and operates its laboratories in accordance with a multitude of regulations, including those issued by EPA and OSHA. These regulations have become increasingly stringent as health and safety hazards have become better understood. As a result, the Institute must make a number of mandated, expensive replacements and repairs of underground storage tanks, overhead cranes, and electrical transformers.

  The Institute also urgently needs modern alarm and control systems. Modern, multipurpose, computer-controlled networks provide far more safety data and control than NIST's aging, electromechanical-relay fire alarm system. The current system has given false alarms during storms and electrical disturbances and is so out-of-date that NIST must sometimes make its own replacement parts.

- Systems Capacity

  The demand for utilities (cooling, heating, electrical service) required to conduct scientific and engineering research is straining the Institute's existing systems. Expansion of the Gaithersburg chilled water system is the most pressing need. The system provides cooling for laboratories and research equipment as well as general air-conditioning. The Institute's mainframe computer and specialized research equipment such as high-power argon ion lasers are coupled directly to the chilled water system.

These repairs and upgrades cannot be avoided, and postponing them will impair operations, imperil employees, and increase the repair bill as deterioration continues.

The NIST Facilities Plan

The Institute has developed a comprehensive, multi-year facilities plan for restoring its physical plant to satisfactory condition. However, it is clear that the needed repairs, now estimated at about $54 million, will require a substantial budget initiative. Thus, our facilities report in July 1990 strongly urged the Department of Commerce to support the facilities initiative in the Institute's 1992 budget proposal. We endorse the Department's request for a $4 million increase for facilities improvements in its 1992 budget request.

NIST should also have a budget mechanism for making future facilities repairs and upgrades as they are needed. We recommend that future facilities improvements be funded through a capital budget line item in the NIST budget. The costs should not be passed along as expenses to the Institute's projects or to its clients. That approach inappropriately taxes other federal agencies, industrial companies, and other research sponsors to pay part of the Institute's facilities repair bill.

NIST is continuing to assess its facilities repair and upgrade needs with the assistance of an independent firm hired to conduct an architectural and engineering study. We plan to meet with NIST and with the contractor to review the results of that study in 1991.

APPROPRIATIONS FOR THE MALCOLM BALDRIGE NATIONAL QUALITY AWARD PROGRAM

We strongly support the appropriation of funds to assist in operating the Malcolm Baldrige National Quality Award program. In only three years, the program has become a focal point of the Quality movement in the United States. The program has been extraordinarily successful, not only in recognizing and rewarding high quality standards among the best U.S. firms, but in providing thousands of other companies with incentives and assistance for improving their performance.

Indeed, the nation's response to the program has been so enthusiastic that the program is in danger of being overwhelmed. In 1990, the program distributed more than 100,000 copies of the application guidelines, which are widely used by firms as self-assessment tools. As industry has turned to the program as a quality management resource, the program has also moved into new, unforeseen roles. For example, the health care and educational communities have asked the program for help in raising the quality of their operations and services.

International interest in the program is growing as other countries seek models for their own quality movements, indicating the respect that the Baldrige Award has earned abroad. Promotion of the Baldrige Award and its principles worldwide is good for the United States, enhancing our reputation as a source of quality products and services. As similar programs are created in other countries, the U.S. will be recognized as a leader in standards and metrics for industrial quality.

The Baldrige Award was set in motion with an industrial endowment which was supposed to pay the full cost of operating the program. However, the program's impact and scope have grown enormously in only three years. As a result, the program is straining to operate with its present resources. Without additional funding, we do not see how the program can continue to lead the rapidly-growing U.S. Quality movement.

We believe that both federal and private funding should be pursued. The value of the Baldrige Award program is unquestionable; the resources needed to operate it properly are minuscule compared to its economic worth to the nation. Thus, we recommend a budget appropriation to alleviate a critical need for additional staff. We also urge the program's Board of Overseers to explore ways of increasing private sector funding. While the initial industrial endowment is now inadequate to support the program, we believe that substantial private sector support is both appropriate and desirable, and believe that it should grow as the program grows.

NIST ORGANIZATION

In February 1990, John Lyons was confirmed as Director of the Institute. We congratulate the Director and his management team on a smooth transition and a very successful first year. The new leadership has shown dedication to maintaining the high quality of NIST's laboratory research and enthusiasm for the new industrial outreach programs.

The Institute is preparing for a time of challenge and opportunity. In our opinion, a key element of that preparation is the development of a new strategic plan to guide the Institute through the next several years. We are now working with the Institute to develop such a plan.

NEW ORGANIZATION PLAN

The Institute recently proposed the new organization shown in Figure 2. The new organization addresses many of the concerns we expressed in our 1988 Annual Report. It eliminates a layer of management and thus should be more responsive. It also improves the balance among technical units in Institute-level decision-making. The laboratories in the new organization are grouped rationally along disciplinary lines.

In our opinion, the primary importance of the organization plan is technical, rather than administrative, because the structure of an organization strongly influences how it works. Two items will require management attention. *First,* the Institute must maintain cross-fertilization among technical disciplines. The most important technical problems frequently require diverse expertise; in research on neural networks, for example, fields as disparate as biology and electrical engineering can come together. In some cases, entirely new technical disciplines arise from these fusions.

Organizational boundaries need not impede technical cooperation, as present collaborations within NIST indicate. Furthermore, the Institute's new approach to scientific and engineering research initiatives encourages collaboration. As noted in our 1989 Annual Report, the Institute has recently begun to propose larger, multidisciplinary research initiatives. Collaboration begins with initiative planning and continues through conduct of the research.

National Institute of Standards and Technology
PROPOSED ORGANIZATIONAL CHART

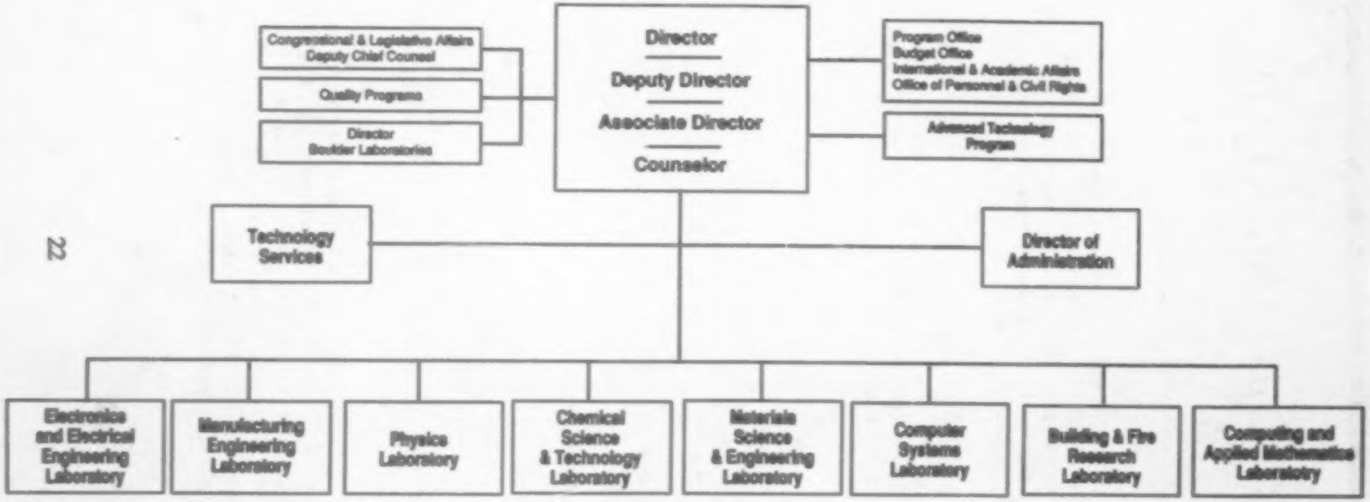
Congressional & Legislative Affairs
Deputy Chief Counsel
Quality Programs
Director
Boulder Laboratories
Director
Deputy Director
Associate Director
Counselor
Program Office
Budget Office
International & Academic Affairs
Office of Personnel & Civil Rights
Advanced Technology Program
Technology Services
Director of Administration
Electronics and Electrical Engineering Laboratory
Manufacturing Engineering Laboratory
Physics Laboratory
Chemical Science & Technology Laboratory
Materials Science & Engineering Laboratory
Computer Systems Laboratory
Building & Fire Research Laboratory
Computing and Applied Mathematics Laboratory

Figure 2

Second, communication between the Institute's laboratory research and industrial outreach programs is essential because, as discussed earlier in this report, we believe that NIST should be a technical participant in the new outreach programs. Because the managers of those outreach programs are mainly NIST veterans with backgrounds in the laboratories, we expect that effective communication will be maintained.

In summary, we believe that the Institute's new organization will improve its efficiency and responsiveness. However, we recognize, as does NIST, that further organizational changes may be needed as the Institute continues to respond to its augmented mission in civilian technology. We discuss some possible changes below under "Future Development of the Institute."

NIST'S ROLE IN U.S. INDUSTRIAL COMPETITIVENESS

The Omnibus Trade and Competitiveness Act of 1988 mandated broad new authorities in civilian science and technology for the Department of Commerce and the National Institute of Standards and Technology. The Trade Act, as the intervening two years have made even more clear, was a major milestone in the Institute's history.

Despite the huge federal research budget and the technological might of the federal research establishment, the federal government still lacks a focus for its efforts to raise the technological competitiveness of the United States. We suggest that the National Institute of Standards and Technology, with the Advanced Technology Program, the Manufacturing Technology Centers, the Malcolm Baldrige National Quality Award, strong science and engineering research, and a host of other industry-oriented programs, has come a long way in the last few years toward providing that focus. As the federal government continues to develop its strategies for supporting civilian technology, we recommend that the central role of NIST be recognized and exploited; the federal government should continue to build on the successful programs it has already established.

FUTURE DEVELOPMENT OF THE INSTITUTE

As the Institute's industrial outreach and technology transfer programs grow, the NIST of tomorrow will become a much different organization from the NIST of today. The changes may be both profound and rapid. As a result, the Institute has begun to think about how it must evolve organizationally in response. We believe strongly that the discipline of strategic planning, discussed earlier, will be particularly effective in anticipating those changes and managing the Institute through them.

The Institute has reviewed with us several models for its future. Among government scientific and technical agencies that administer large extramural programs, the National Institutes of Health (NIH) and the Defense Advanced Research Projects Agency (DARPA) are being studied carefully.

NIH has become the world leader in medical science and technology through the synergism of a contract research program coupled with a large internal laboratory research effort. The Visiting Committee believes that NIST can do the same in civilian technology. From the perspectives of mission and organizational structure, NIH is probably the best overall paradigm for NIST.

DARPA, which identifies and responds to defense technology needs, is an outstanding example of contract research management. The agency has developed an excellent reputation for project management and oversight, and for its quick response to technological targets. DARPA has no laboratories of its own, and is thus an incomplete model for NIST, but the quality of its operations sets a high standard that NIST should strive to match.

APPENDICES

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APPENDIX A

Summary of Visiting Committee on Advanced Technology Activities, Fiscal Year 1990

Reports

- *1989 Annual Report of the Visiting Committee on Advanced Technology* to the Secretary of Commerce and Congress. (January 1990)
- *Technology for U.S. Industry: A Review of National Institute of Standards and Technology Support of Industry in Science, Engineering, and Technology Transfer.* (October 1989, rev. January 1990)
- *The Advanced Technology Program: Recommendations of the Visiting Committee on Advanced Technology to the Department of Commerce.* (April 1990).
- *Repair and Upgrade of Facilities of the National Institute of Standards and Technology.* (July 1990)
- *The Manufacturing Technology Centers Program.* (September 1990)

(Copies of all reports are available from the Executive Director of the Visiting Committee on Advanced Technology, NIST, Gaithersburg, MD 20899.)

Special Meetings and Fact-Finding Trips

- Meeting with Deputy Secretary Murrin and other Department of Commerce officials on January 11, 1990 to present and discuss the *1989 Annual Report* and related subjects.
- Advanced Technology Program meeting with Department of Commerce Officials on March 5, 1990 to provide advice on initiating and operating the program.
- Meeting with Deputy Secretary Murrin on July 20, 1990 to discuss the facilities initiative and other budget items.
- Fact-finding visits to Manufacturing Technology Centers, June 5-7, 1990.

Congressional Testimony

- Testimony on Department of Commerce technology programs to the House Subcommittee on Science, Research, and Technology of the House Committee on Science, Space, and Technology, February 6, 1990 (Arden Bement, Chairman, Visiting Committee on Advanced Technology).

Quarterly Business Meetings and Principal Topics

Meeting Dates:
December 11, 1989; March 5, 1990; June 25-26, 1990;
September 18-19, 1990

Principal Topics: (Topics were usually discussed at several meetings)

- NIST Facilities: Safety, Systems Capacity, and Technical Obsolescence Problems
- The Manufacturing Technology Centers Program
- The Advanced Technology Program
- Industrial Relations

  NIST Policies
  Cooperative Research and Development Agreements
  NIST Communications Efforts

- Reports from the Board on Assessment on NIST's laboratory research programs
- EC 92 and International Standards Issues
- The Malcolm Baldrige National Quality Award Program and Plans for a National Quality Institute
- Total Quality Management at NIST
- NIST Budget Issues

  Budget Status and Planning
  1992 Budget Request
  Budget Initiatives

- NIST Strategic Planning

APPENDIX B

Executive Summary
Manufacturing Technology Centers Report
(October 1990)

The Manufacturing Technology Centers (MTC) program was created to help the nation's small and mid-sized businesses improve their productivity and technological performance. Now in its second year of operation, the program has a 1990 appropriation of $7.5 million. The MTC program establishes regional centers to serve as technology transfer agents, bridging a technology gap between sources of manufacturing technology and small and mid-sized companies. The potential clientele of the program includes some 350,000 U.S. firms.

The first three centers are: the Great Lakes Manufacturing Technology Center (GLMTC) in Cleveland, Ohio; the Northeast Manufacturing Technology Center (NEMTC) at Rensselaer Polytechnic Institute in Troy, New York; and the Southeast Manufacturing Technology Center (SMTC), with headquarters at the University of South Carolina in Columbia, SC.

The MTC program has made a promising start toward improving the technological competitiveness of small firms and deserves continued support. If the program continues to meet its goals, it should be expanded to its intended size of about 12 centers in incubation at a time. As the MTC program grows, it should plan for and encourage operational, technical, and geographical diversity.

Because the MTC program is small and the national competitiveness problem is large, expectations regarding the program's impact must be realistic. In the short term, the program should be judged on whether it provides useful services and yields a satisfactory return on investment. After new centers have been established over a period of several years, the program should be able to show a nationally-significant contribution to the nation's industrial competitiveness effort.

Centers

The first three centers are evolving differently, reflecting their technological and organizational strengths and the needs of their clients. All of the centers have hired capable, motivated people and have equipped demonstration facilities and laboratories. They offer a wide range of services including project engineering, training courses, demonstrations, and help in selecting and using software and equipment. Center services have been supported enthusiastically by clients.

The centers have made direct contact with hundreds of small companies and have already provided substantial benefits to dozens of them. Thus far, the most important center service involves direct engineering assistance to individual companies on particular manufacturing problems. As the centers mature, they should strive for broader impact by selecting methods and projects with greater leverage and by working through small business and technology transfer networks.

Centers should pursue opportunities to develop and offer new technology delivery methods and services. For example, they can help to improve the culture as well as the manufacturing operations of small companies by applying and teaching the concept of Total Quality; NIST can assist the centers by making available the expertise of its Malcolm Baldrige National Quality Award program. Also, centers should respond to the clear need for training with innovative programs that are tailored to small firms and their employees.

As the centers continue to develop, they should add professional business and marketing operations to complement their technical operations, either by strengthening their own capabilities or by joining with other organizations that have the requisite skills.

The first three centers have claimed large, multi-state service regions; realistically, however, they will probably have to focus project engineering services on smaller regions where extensive personal support is possible. They can and should, however, serve broader service regions with services such as training courses and workshops, and through networks with other technology transfer organizations.

Program Management

The MTC program managers at NIST have helped the centers to define their programs and to establish linkages with the larger technology transfer community. NIST has given the centers considerable autonomy, encouraging them to be creative and responsive to small business needs in developing services. NIST's role as a technology source and conduit has been modest to date, but should become more important as the centers move toward higher-leverage programs. In anticipation, the Institute's primary task is to develop a pro-active technology transfer plan.

NIST is exploring the expansion of its services to the centers. These services are potentially valuable, but should only be undertaken if centers strongly support them. Other possible NIST activities, such as documentation of technology transfer case studies and center operating experiences, can also be worthwhile, but the focus of the program must remain on technology assistance to small company clients.

Financial Issues

The Manufacturing Technology Centers program was designed to be, and should remain, an incubator for centers that become financially independent after six years of operation. To ensure their future operation, centers must convince their clients and state/regional industrial development agencies that their programs provide a good return on investment. Those that cannot are unlikely to be effective.

Experience with the first three centers has shown that new centers must have stable funding to provide a platform from which they can concentrate on technology delivery, long-range planning, and development of long-term state and regional support. In establishing centers, the federal government should enable them to realize their full potential by providing stable, multi-year center funding.

In awarding future centers, the Department of Commerce should give substantial weight to strong state/regional support, integration of the center into an overall economic development plan, and broad industrial interest as well as technological capabilities. If the groundwork for financial support is firm before the center is established, its chances for success will be greatly enhanced.

Center Evaluations

Each center must be evaluated during its third year of operation by a panel appointed by the Secretary of Commerce. Because centers that receive unsatisfactory evaluations will lose their program funding, thorough and impartial evaluations are essential. A highly-qualified evaluation panel should be selected from among small business leaders, state and regional development officials, technology development and transfer experts, representatives from manufacturing associations and professional societies, and other interested constituencies.

The panel should begin its evaluation by consulting with the business and technology communities to develop a list of concerns and questions for the review. All other external reviews of the MTC program should be deferred until after the mandated third-year evaluation.

Addendum to the 1990 Visiting Committee Report

The NIST budget initiatives for FY 1992 referred to on pages 17 and 18 reflected a sampling of proposals considered within the Administration prior to final budget decisions by the President. Although the President's FY 1992 budget request for NIST includes a substantial number of proposed science and engineering research initiatives, some of the initial proposals were not included, such as atomic scale electronics and bioprocess engineering. The Visiting Committee supports the budget initiatives in the form being submitted by the Administration to Congress.

The Visiting Committee on Advanced Technology

THE MANUFACTURING TECHNOLOGY CENTERS PROGRAM

A REPORT TO THE
SECRETARY OF COMMERCE
BY
VISITING COMMITTEE ON ADVANCED TECHNOLOGY
THE NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY

OCTOBER 1990

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FOREWORD

The Manufacturing Technology Centers (MTC) program operated by the National Institute of Standards and Technology (NIST) is nearing the end of its second year of operation. Our review of the MTC program was conducted to determine whether the program is (a) achieving its stated goal of helping small and mid-sized businesses to become more technologically competitive, and (b) providing a useful blueprint for industry-government cooperation. The review was not intended as a detailed appraisal of the day-to-day operation of the centers, their personnel, or specific center programs. This report contains our findings, as well as our recommendations for program strategies, operations, and financial support.

During our review, we gathered factual information and opinions from several sources. The MTC management at NIST provides regular reports at Visiting Committee meetings and was interviewed extensively during preparation of this report. Visiting Committee teams made site visits to all three MTCs in June 1990; each visit included meetings with small business clients as well as the center management and staff. Written sources of information included the enabling legislation, the reviews of the thirty-six first round center proposals by the National Research Council, center progress reports, and comments by the National Society of Professional Engineers.

We acknowledge the cooperation of the National Institute of Standards and Technology, especially the Manufacturing Technology Center Program Director, the Director of Technology Services, the NIST Director, and the Budget Office. We also thank the first three centers for the opportunity to meet with their Directors and staff, tour their facilities, and talk with representatives from small companies with whom they have worked.

The Visiting Committee on Advanced Technology
October 1990

THE VISITING COMMITTEE ON ADVANCED TECHNOLOGY

1990

The Visiting Committee on Advanced Technology of the National Institute of Standards and Technology (NIST) was established by the Omnibus Trade and Competitiveness Act of 1988. The Committee, in its role as principal private sector advisor to NIST, reviews and makes recommendations regarding the general policy, organization, budget, and programs of the Institute.

Arden L. Bement, Jr., Chairman
TRW Inc.

William G. Howard, Vice Chairman
National Academy of Engineering

John G. Bollinger
University of Wisconsin

Jeanette G. Grasselli
Ohio University

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William P. Slichter
AT&T Bell Laboratories (retired)

Nam P. Suh
Massachusetts Institute of Technology

Albert R.C. Westwood
Martin Marietta Corporation

Dale E. Hall, Executive Director

EXECUTIVE SUMMARY

The Manufacturing Technology Centers (MTC) program was created to help the nation's small and mid-sized businesses improve their productivity and technological performance. Now in its second year of operation, the program has a 1990 appropriation of $7.5 million. The MTC program establishes regional centers to serve as technology transfer agents, bridging a technology gap between sources of manufacturing technology and small and mid-sized companies. The potential clientele of the program includes some 350,000 U.S. firms.

The first three centers are: the Great Lakes Manufacturing Technology Center (GLMTC) in Cleveland, Ohio; the Northeast Manufacturing Technology Center (NEMTC) at Rensselaer Polytechnic Institute in Troy, New York; and the Southeast Manufacturing Technology Center (SMTC), with headquarters at the University of South Carolina in Columbia, SC.

The MTC program has made a promising start toward improving the technological competitiveness of small firms and deserves continued support. If the program continues to meet its goals, it should be expanded to its intended size of about 12 centers in incubation at a time. As the MTC program grows, it should plan for and encourage operational, technical, and geographical diversity.

Because the MTC program is small and the national competitiveness problem is large, expectations regarding the program's impact must be realistic. In the short term, the program should be judged on whether it provides useful services and yields a satisfactory return on investment. After new centers have been established over a period of several years, the program should be able to show a nationally-significant contribution to the nation's industrial competitiveness effort.

Centers

The first three centers are evolving differently, reflecting their technological and organizational strengths and the needs of their clients. All of the centers have hired capable, motivated people and have equipped demonstration facilities and laboratories. They offer a wide range of services including project engineering, training courses, demonstrations, and help in selecting and using software and equipment. Center services have been supported enthusiastically by clients.

The centers have made direct contact with hundreds of small companies and have already provided substantial benefits to dozens of them. Thus far, the most important center service involves direct engineering assistance to individual companies on particular manufacturing problems. As the centers mature, they should strive for broader impact by selecting methods and projects with greater leverage and by working through small business and technology transfer networks.

Centers should pursue opportunities to develop and offer new technology delivery methods and services. For example, they can help to improve the culture as well as the manufacturing operations of small companies by applying and teaching the concept of Total Quality; NIST can assist the centers by making available the expertise of its Malcolm Baldrige National Quality Award program. Also, centers should respond to the clear need for training with innovative programs that are tailored to small firms and their employees.

As the centers continue to develop, they should add professional business and marketing operations to complement their technical operations, either by strengthening their own capabilities or by joining with other organizations that have the requisite skills.

The first three centers have claimed large, multi-state service regions; realistically, however, they will probably have to focus project engineering services on smaller regions where extensive personal support is possible. They can and should, however, serve broader service regions with services such as training courses and workshops, and through networks with other technology transfer organizations.

Program Management

The MTC program managers at NIST have helped the centers to define their programs and to establish linkages with the larger technology transfer community. NIST has given the centers considerable autonomy, encouraging them to be creative and responsive to small business needs in developing services. NIST's role as a technology source and conduit has been modest to date, but should become more important as the centers move toward higher-leverage programs. In anticipation, the Institute's primary task is to develop a pro-active technology transfer plan.

NIST is exploring the expansion of its services to the centers. These services are potentially valuable, but should only be undertaken if centers strongly support them. Other possible NIST activities, such as documentation of technology transfer case studies and center operating experiences, can also be worthwhile, but the focus of the program must remain on technology assistance to small company clients.

Financial Issues

The Manufacturing Technology Centers program was designed to be, and should remain, an incubator for centers that become financially independent after six years of operation. To ensure their future operation, centers must convince their clients and state/regional industrial development agencies that their programs provide a good return on investment. Those that cannot are unlikely to be effective.

Experience with the first three centers has shown that new centers must have stable funding to provide a platform from which they can concentrate on technology delivery, long-range planning, and development of long-term state and regional support. In establishing centers, the federal government should enable them to realize their full potential by providing stable, multi-year center funding.

In awarding future centers, the Department of Commerce should give substantial weight to strong state/regional support, integration of the center into an overall economic development plan, and broad industrial interest as well as technological capabilities. If the groundwork for financial support is firm before the center is established, its chances for success will be greatly enhanced.

Center Evaluations

Each center must be evaluated during its third year of operation by a panel appointed by the Secretary of Commerce. Because centers that receive unsatisfactory evaluations will lose their program funding, thorough and impartial evaluations are essential. A highly-qualified evaluation panel should be selected from among small business leaders, state and regional development officials, technology development and transfer experts, representatives from manufacturing associations and professional societies, and other interested constituencies.

The panel should begin its evaluation by consulting with the business and technology communities to develop a list of concerns and questions for the review. All other external reviews of the MTC program should be deferred until after the mandated third-year evaluation.

THE MANUFACTURING TECHNOLOGY CENTERS PROGRAM

Introduction

The Manufacturing Technology Centers (MTC) program was established at the National Institute of Standards and Technology by the Omnibus Trade and Competitiveness Act of 1988. The objective of the program is to help the nation's small and mid-sized businesses adopt advanced manufacturing technologies, processes, and practices to enhance their productivity and technological performance.

Regional centers are the focal points and primary technology transfer agents of the MTC program, as shown in Figure 1 (page 2). Currently, three centers are operating:

> The Great Lakes Manufacturing Technology Center (GLMTC) in Cleveland, a unit of the Cleveland Advanced Manufacturing Program (CAMP).
>
> The Northeast Manufacturing Technology Center (NEMTC) at Rensselaer Polytechnic Institute in Troy, New York, affiliated with Rensselaer's Center for Manufacturing Productivity and Technology Transfer.
>
> The Southeast Manufacturing Technology Center (SMTC), with headquarters at the University of South Carolina in Columbia and branches in the state's technical college system.

These centers help to bridge a technology gap between sources of manufacturing technology and the small and mid-sized companies that need it. Technology sources include NIST and other federal laboratories, universities, research and development organizations, consultants, industrial companies with particular expertise, vendors of equipment and software, professional associations, other technology transfer organizations, and the technical staffs of the centers. The potential clientele of some 350,000 small and mid-sized companies in the United States is highly fragmented and technologically diverse in both type and degree.

The Manufacturing Technology Centers program was created to help industry exploit existing advanced technology rather than to develop new technology. With its focus on technology application, the MTC program complements the Advanced Technology Program (ATP) in which NIST and industrial partners will cooperate to develop new, strategically-important civilian technologies. Thus, each program addresses a different, crucial aspect of the nation's industrial competitiveness. The two programs also operate differently: while the ATP will give grants directly to

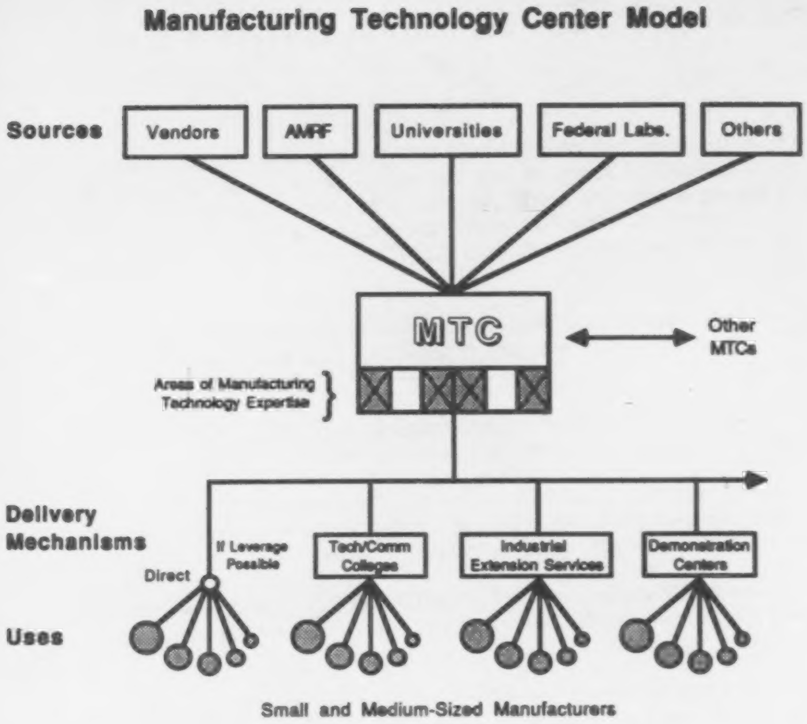

Manufacturing Technology Center Model
Sources
Vendors
AMRF
Universities
Federal Labs.
Others
MTC
Other MTCs
Areas of Manufacturing Technology Expertise
Delivery Mechanisms
Direct
If Leverage Possible
Tech/Comm Colleges
Industrial Extension Services
Demonstration Centers
Uses
Small and Medium-Sized Manufacturers

Figure 1. The Manufacturing Technology Center model. The center is the focal point for technology transfer between sources and users of technology.

industrial firms and consortia, the MTC program funds only the centers, providing no direct grants to small businesses.

Our review of the Manufacturing Technology Centers program, summarized in this report, was guided by the following questions:

> Is the MTC program demonstrating that it can: (a) help small and mid-sized companies solve their manufacturing technology problems and improve their operations; and (b) have a nationally-significant impact on our industrial competitiveness?
>
> What mechanisms are being developed for technology transfer, and how effective have they been?
>
> Are the necessary linkages being developed between: (a) the centers and their clients; (b) NIST and the centers; (c) the centers and state/regional industrial and technology development agencies; (d) the centers and other technology transfer entities around the nation? Are the three centers cooperating effectively with each other?
>
> What operational and financial problems do the centers face, and what should be done to address them?
>
> Is NIST providing adequate and well-directed management and program support to the centers?

Our findings and conclusions are summarized in the next section of the report, followed by our recommendations on programmatic and financial issues of the program. The final section of the report discusses future evaluations of the MTC program.

Findings and Conclusions

Program Status

The MTC program has made a promising start. The three centers have hired capable, motivated people and have equipped demonstration facilities and laboratories. The centers have evolved along different lines according to the nature of their parent organizations, their technological and organizational strengths, and the needs of their clients. A brief comparison of the three centers is given in Appendix A.

Each center is surveying and analyzing the small business community in its service region to determine its most important technology needs. Although these studies are not yet complete, clear differences are obvious from center to center, as Appendix A indicates. In response, each center has developed a menu of technology transfer mechanisms tailored to its clients. Because the development of technology transfer mechanisms is a crucial part of the MTC program, this subject is discussed in detail later under a separate heading.

The centers have made direct contact with hundreds of small companies as part of their outreach activities, and have already provided substantial benefits to dozens of them. Services have ranged from consultation on shop floor organization and basic productivity management to help in selecting, installing, operating, and integrating computer-controlled design and manufacturing equipment. These successes are building the reputations of the centers among small companies and potential funding sources. While the projects undertaken thus far have provided little leverage, they are necessary first steps to establish the credibility of the centers as practical technical resources.

During the program's first two years, the MTC program managers have helped the centers to shape their programs and to form linkages among themselves and with the larger technology transfer community. MTC management at NIST has emphasized high quality standards in center operations, and the importance of working toward eventual financial independence. NIST has encouraged the centers to be creative and responsive to small business needs in developing services, favoring a market-driven approach; this is an important aspect of the MTC program. The Institute has used its experiences with the first three centers to draft a clearer and tighter set of rules for the second round of competition for future centers.

NIST has also met with many groups interested in the MTC program, including potential clients, industrial associations, technology transfer organizations, and community college associations. The Institute targets its publicity effort to a selected audience, believing (rightly, we think) that too much general publicity at this early stage could overwhelm the centers.

Recently, MTC program management at NIST has been considering the expansion of its program activities. New services provided by the Institute to the centers could include: (a) coordination, development, and setting of standards for training programs; and (b) assistance in developing and implementing small company assessment tools. In addition, the compilation, analysis, and dissemination of technology transfer case studies to small companies would allow those firms to pursue similar courses when appropriate, thus increasing the leverage of the program. Finally, documentation and analysis of the experiences of the program and the individual centers could help to guide further development of the MTC program and establishment of other government-industry partnerships.

Final decisions on whether these activities should be undertaken belong to NIST management. The Trade Act, which specifically mentions NIST's roles in developing and transferring technology in the program, appears to give the Institute considerable freedom in other aspects of program management. If the new MTC activities outlined above are initiated at NIST, we believe that they should be kept in proper balance by limiting the fraction of the program budget devoted to them; the focus of the program was clearly intended to be on center-client interactions. NIST services to centers, such as (a) and (b) in the preceding paragraph, should be offered only if the centers strongly support them.

Technology Transfer Services and Mechanisms

Because the technology needs of small companies vary widely, the centers have developed a variety of technology transfer services and mechanisms. The primary mechanism at all three centers is direct project assistance. This involves extensive, hands-on interactions between center and client personnel to solve particular manufacturing problems. Interviews with several clients at each of the three centers indicated that direct project assistance has been highly effective in improving their manufacturing practice. Examples of some successful programs, supplied by the centers, are included in Appendix B; an illustration from one of these programs is shown in Figure 2.

Other technology transfer mechanisms are generally less intensive. As a result, their economic value is more difficult to quantify, but they reach a larger clientele. The centers provide technical training courses, demonstrations of hardware and software, shop floor facilities where clients can learn about and work with new equipment, seminars and other technical presentations, assessments of current practice (Figure 3), and brokering between vendors and clients. These services, too, have been enthusiastically supported by small companies.

All three centers report that training is one of their most valued services. This training ranges from improving the basic competence of the workforce to hands-on instruction in advanced manufacturing practice and computer technology. All of the centers have wisely involved two-year technical colleges in their training programs. These institutions are experienced and well-equipped for providing vocational education and training. GLMTC, taking advantage of the high concentration of small businesses nearby, has developed a successful monthly Luncheon Forum. The meetings typically bring together over 100 industrial representatives to hear presentations on some aspect of business or manufacturing practice. The industrial participants also use the forums to make new contacts and exchange information.

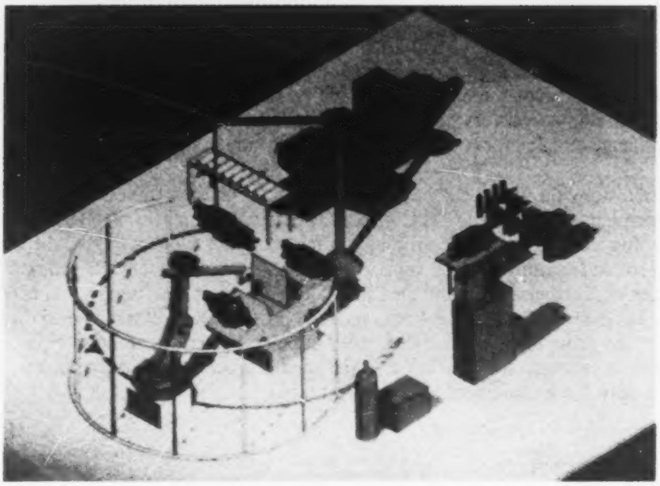


Figure 2. Computer simulation used by the Southeast Manufacturing Technology Center in a study of robotic welding of lift trucks for a client company. The new technology, now being implemented, has an estimated economic impact of $3.5 million. (Photo courtesy of the Southeast Manufacturing Technology Center.)

Figure 3. Manufacturing technology assessments are important center services to small businesses. Ray DePuy, right, Manager of Industry Programs at the Great Lakes Manufacturing Technology Center, conducting a technical assessment with Mike Behary, President of Cleveland Machine Controls. (Photo courtesy of the Great Lakes Manufacturing Technology Center.)

The development of effective training programs is one of the key tasks facing the MTC program. The centers must structure training to meet the needs of the clients, recognizing that the traditional academic approach to education is not always appropriate. For example, companies and their employees often find concentrated training programs of one to several days more cost-effective and convenient than semester-long academic courses that meet for a few hours a week. Industrial trainees may have a much wider range of experience and ability than a typical college class, and courses must be designed accordingly. In addition, course credit or progress toward a degree may be irrelevant to many small business employees, and academic regulations could hinder their participation.

Vendors of manufacturing equipment, computer hardware, and software are essential sources of technology for the MTC program. Their marketing interests provide a powerful technology push, and their products often provide expedient and cost-effective solutions to manufacturing problems. Centers provide an invaluable service by objectively helping small companies select and implement appropriate commercial technology from an often bewildering array of options. Without their help, many small companies will be reluctant to invest in equipment or software that may not provide expected benefits (some of the companies we talked with have already had such experiences).

All three centers have established strong ties with vendors, especially in computer hardware and software. Vendor donations have helped the centers to equip demonstration and training facilities. Strong vendor-center relationships, while invaluable, also present potential conflict-of-interest problems. Centers must not become over-reliant on certain suppliers. The centers have shown, and have an ethical responsibility to maintain, objectivity in helping small firms to select commercial equipment and software.

The impact of NIST's Automated Manufacturing Research Facility (AMRF) on the program has been modest to date. NEMTC has identified three AMRF projects with potential value to its clients: (a) Real-time Control Systems (RCS), which are used to link several pieces of hardware together into coordinated systems, especially for robotics; (b) feature-based design, an extension of computer-aided design (CAD) that specifies parts by their geometric features; and (c) computer-aided inspection. The hardware and software for RCS have already been transferred to one small company, as shown in Figure 4, and NEMTC has acquired the technology for feature-based design. GLMTC has used NIST's "Shop of the 90s" technology to assist clients, and has drawn on the experience of the AMRF in developing its own shop floor.

Opportunities to transfer expertise, knowledge, and techniques from the AMRF (and the federal laboratory system in general) will probably increase as the centers mature and strive for more leverage. The transfer of large, turnkey packages of AMRF technology will probably be rare. (The AMRF has shown that it can successfully transfer technology in this way to the Navy, but the MTC clients are much less technologically advanced.) The AMRF and other NIST laboratories may make their most substantial contributions by helping small firms to adopt generic technologies of widespread utility such as the Product Description Exchange

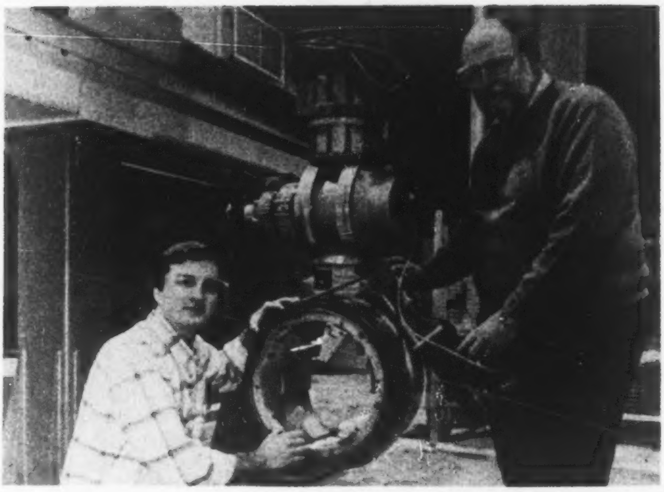


Figure 4. End-of-arm tooling used in a robotic filament winder, an application of the NIST Realtime Control System (RCS) for a client of the Northeast Manufacturing Technology Center. Right, Center Director Gene Simons; left, graduate student Glenn Tarbox. (Photo courtesy of the Northeast Manufacturing Technology Center.)

Figure 5. Technical briefing for Manufacturing Technology Center Directors and staff members at the Institute's Automated Manufacturing Research Facility (AMRF). Seated, Gene Simons, Director, NEMTC. Standing from left to right: NIST engineer Kang Lee; George Sutherland, Director, GLMTC; Ron Brandow, NEMTC; Kent Kemmerer, GLMTC; Bill Ranson, Director, SMTC. (Photo courtesy of the National Institute of Standards and Technology.)

Specification (PDES, a standard digital representation of product data that completely defines the physical and functional characteristics of a product throughout its life cycle).

Transfer of NIST laboratory technology to the centers requires a pro-active plan and the commitment of the Institute's managers, scientists, and engineers. The Institute's strategy should promote direct contact between NIST researchers and center staff; there is no equally-effective substitute for personal interaction (Figure 5). In addition, NIST must develop ways to educate center personnel, on a continuing basis, about the vast and constantly-advancing array of NIST technology available.

The three centers are now working together to develop efficient and broadly-applicable tools for analyzing client problems and identifying appropriate solutions. The assessment must produce self-consistent results when used by different center personnel, and the process, its objective, and its results must be easily understandable by the client. An assessment method that meets these criteria and also minimizes the need for extensive personal interactions will save considerable center staff time for project engineering.

We believe that the centers can benefit in this work from the experience of the Malcolm Baldrige National Quality Award program at NIST. For example, the Quality Office at NIST has already developed industrial assessment tools and training courses for its evaluators. While the two programs have different objectives and evaluate different types of companies, the basic principles of quality operation are applicable in any program to improve manufacturing practice. The MTC program management at NIST can perform an important service by helping the centers to gain access to the expertise of the Baldrige Award program.

Indeed, we think that the centers should put more specific emphasis on the concept of Quality. Quality principles guide much of the centers' efforts in helping their clients; however, those underlying principles are transparent to the clients unless they are explicitly taught. *Centers must teach small companies that specific improvements to their operations must be part of a larger commitment to Quality in all aspects of their businesses.*

Leverage

The centers' accomplishments to date have come mainly from direct technical project assistance to individual companies. However, as the MTC program management at NIST points out, this one-on-one approach (while highly effective) by itself cannot produce a nationally-significant impact on the competitiveness of several hundred thousand small businesses. To do so, the MTCs must leverage their efforts for greater impact. Correspondingly, much of the program's planning is now directed toward expanding the MTC program's contribution to national industrial competitiveness.

Three kinds of leverage are possible. ***Technological leverage*** multiplies the technological impact from a given commitment of resources through technology delivery methods that are less resource-intensive and more widely-applicable. The MTC program must strive for high technological leverage because the number of centers will always be very small relative to the number of potential clients. Thus, the MTC program must find ways to help classes of small companies with similar manufacturing problems without compromising working relationships with individual companies. The program can, for example, disseminate case histories of successful projects to small firms through industrial associations and technology transfer networks; this will enable firms with similar problems to replicate or adapt the projects to meet their own technology needs.

Technological leverage will require an institutional memory for retrieval, re-use, and extension of technology. This requires staff continuity, and, in turn, stable funding. Students and other short-term workers may be cost-effective, but a core staff is also needed. Centers that live on a "hand-to-mouth" basis will not develop high technological leverage.

The ***financial leverage*** of the MTC program, measured by the effect of federal dollars on the technological strength of the nation's small business, will be high if the program continues to develop as envisioned in the Trade Act. That is, as successful, financially-independent centers are launched, they will continue to contribute to the nation's industrial competitiveness at no further cost to the program.

After MTC program support ends, centers will have to require financially-able clients to pay at least part of the cost of the services they receive. This arrangement is consistent with the intent of the program, which was created to provide technological, not financial, assistance. The centers will almost certainly need funding from state and regional development agencies as well. However, such support will probably be contingent on evidence that center services are worthwhile, as indicated in part by clients' willingness to pay some of the cost.

Geographical leverage extends the impact of each center to a larger region. Primary means of geographical leverage include small business networks, information exchange among the centers, and interactions with other technology transfer programs. Networks in the small business community are essential. The centers are not responsible for forming these networks, but should work with regional and state development agencies to promote their formation, and must use them to publicize their activities to potential clients.

The first three centers have claimed very large service regions, which together include virtually the entire eastern half of the country. (The Trade Act specifies the "extent of the service area" as a criterion in awarding centers.) However, our discussions with center engineers and clients and our review of successful engineering projects lead us to believe that centers will have difficulty in providing direct project engineering services effectively to such large regions because of the extensive personal contact required. As a result, we recommend that centers should focus these services on smaller areas, as they are now doing. For pragmatic reasons that involve funding (discussed on page 13), these areas could be defined as single states, or even parts of states. The broader service region can be served by working through networks with other technology transfer organizations, by developing and packaging generic technology that can be transferred with less personal interaction, and by offering non-project services such as conferences, workshops, and training.

The Role of the MTC Program in National Competitiveness

Two aspects of the role of the MTC program in improving U.S. industrial competitiveness are discussed here: (a) does the program fit into the national effort and complement other parts of that effort, and (b) can the program have a nationally-significant impact?

Regarding point (a), we believe that the Manufacturing Technology Centers program combines and catalyzes efforts of state and local governments, academic institutions, small businesses, and the large federal research and development establishment. The MTC program provides startup funding for centers that originate at the state and regional levels (with substantial participation by state industrial development agencies and academic institutions, as the first round of center proposals showed) and assists the states in coordinating them into an effective national effort. Through NIST and the Federal Laboratory Consortium, the MTC program offers ready access to over 700 federal laboratories with a combined annual research and development budget of about $20 billion, powerful technology resources that the states lack.

States have a key role in promoting technological innovation because they understand local needs and resources and can be flexible in developing, testing, and -- if necessary -- abandoning new policies (1). NIST encourages their participation in and influence on the Manufacturing Technology Centers by giving the centers considerable operating freedom to adapt their programs to their local circumstances. No uniform model for center operation has been (or should be) prescribed. More importantly, state, local, and regional agencies will have a direct, substantial voice in center operations because, as discussed under the next heading, their continued financial support will be necessary for the survival of the centers.

On the question of nationally-significant impact, we caution against unrealistic expectations. The program is minuscule in comparison either to the national competitiveness problem or to the existing national effort to address it. For example, forty-four states spent a total of $550 million in 1988 (1); in contrast, the 1990 MTC program appropriation was only $7.5 million. In the short term, the appropriate questions are whether the program is providing useful assistance, yielding a satisfactory return on investment, and moving toward greater impact on and integration into the national effort. If the program fulfills these criteria, it is worthy of continuation.

Because the MTC program is an incubator, continually creating and spinning off technology transfer centers, its cumulative influence will grow with time. After several years of operation, assuming that funding has been provided to establish new centers on a regular basis, centers will be operating in many parts of the country, supporting a wide variety of technologies. At that time, it is appropriate to expect the program to have made a clearly-identifiable and nationally-significant contribution to the competitiveness of the nation's small and mid-sized companies.

The Manufacturing Technology Centers program is a laboratory for experiments in government-industry cooperation as well as a technology transfer program. The Trade Act, while laying out broad goals for the program, gave NIST and the centers latitude to shape the program to meet those goals. To manage the program through a time of growth and change, NIST needs a plan based not only on present circumstances, but also on a vision of what the program should be when it reaches maturity. We encourage the Institute to develop and articulate this vision, and will continue to consult with NIST management on this subject.

Progress Toward Financial Independence

The Manufacturing Technology Centers program was designed to create centers that become financially independent from NIST. The enabling legislation prohibits centers from receiving NIST support for more than six years. Each new center proposal is judged partly on the center's ability to provide fifty percent matching support in the first three years of operation, and to achieve full financial independence after the sixth year.

We consider the creation of self-sustaining centers to be crucial; the MTC program is an incubator, not a permanent entitlement. In the first order, we agree with Stuart Rosenfeld, Director of the Southern Technology Council, that "the best way to know whether a program is effective is to ask clients to pay for services" and that "Too much subsidy ... results in employing the wrong people and working on the wrong projects. In a fee-driven system, by contrast, clients' needs ... shape the ... agenda." (2) However, while the rationale for a client-supported program is clear, we also think it unlikely that centers will be able to support themselves entirely from client charges, given the small size and relative weakness of many of the clients. Some funding from state or regional development agencies (which are also clients in a sense) or similar entities will be necessary.

Because centers are obliged to provide services to client companies regardless of state boundaries, state agencies may be reluctant to fund them without assurances that their funds will be spent only on in-state activities. While SMTC has apparently passed this hurdle, having achieved funding through a line item in the South Carolina state budget, NEMTC has already encountered difficulties with New York State. Because the centers are on a strict funding timetable and are almost certain to need substantial state funding after MTC program funding ends, they should resolve any such jurisdictional problems quickly.

All of the existing centers expressed concern about their financial futures after their MTC program support ends. To ensure their long-term survival, centers will have to be aggressive in pursuing funding options available to them, including development of new services to attract paying clients. NEMTC is already exploring this option, developing certification programs for small business suppliers to large companies. Also, centers should enlist the active political support of satisfied client companies to obtain state and local funding.

We do not believe that extension of MTC program support to the centers after six years (which would require legislation in any case) is consistent with the intent or the best interests of the program. If centers, no matter how strong technically, are unable to convince their clients and state/regional agencies that their programs provide a good return on investment, it is unlikely that they will have a significant impact on regional or national technological competitiveness.

In awarding future centers, strong state/regional support should be given substantial weight. Important elements include not only financial commitments, but the support of business, government, and academic leaders; integration of the center into an overall economic development plan; and broad industrial interest. If the groundwork for financial support is laid before the center is established, the chances for success of the center will be greatly enhanced.

Recommendations

Simon Ramo, the co-founder of TRW Inc., technologist, and entrepreneur, recently wrote (3):

> In an increasingly technological society, we will need substantially more imaginative cooperation between the private and the public sector. Such cooperation has never been the American way, and that will have to change.

We believe that the Manufacturing Technology Centers program is a small but worthwhile harbinger of that change, and make the recommendations below accordingly. It is significant that many of our recommendations are based on the program's experiences to date. We have thus learned a great deal about government-industry cooperation from the program already, and expect to learn more in the future.

Program Management and Implementation

1. The MTC program must plan for and work toward a prominent role in the national effort to improve U.S. technological competitiveness. Accordingly, centers should strive to increase their leverage by selecting projects with widespread applicability and by working through small business and technology transfer networks. We caution against unrealistic expectations; the program is small and the problem it addresses is very large.

2. The MTC program should encourage operational, technical, and geographical diversity as new centers are founded. The success of any center should be analyzed for useful ideas, but should not become the basis of a formula for operating other centers.

3. NIST should continue to re-evaluate its role in program management and technology transfer as the MTC program matures. Most importantly, the Institute must develop a pro-active strategy for moving technology from the Institute's laboratories to the centers, including opportunities for direct contact between NIST researchers and center engineers. Other new program activities undertaken by NIST should be subordinate to and consistent with the primary objective of providing technology to small firms through the centers; new services to centers should be provided only if centers strongly support them.

4. The MTC program must formally integrate the concept of Quality into its services to promote the cultural as well as technical changes that will improve the performance of small businesses. Whenever possible, the MTC program should use the Malcolm Baldrige National Quality Award program as a resource.

5. Centers should focus their project engineering services on geographic regions where direct interactions with clients are feasible. Larger regions can be served using other technology transfer mechanisms, and through networking and

information exchange. Evaluations of new center proposals should not give undue weight to the mere size of the service region.

6. Centers should develop professional business and marketing operations to complement their technical operations. GLMTC, the most advanced center in this respect as a result of its affiliation with CAMP, represents one good model. Centers can accomplish this objective by developing in-house capabilities, by drawing on the resources of their parent organizations, or by joining with state and regional development agencies.

7. The MTC program must emphasize training as a principal function of all present and future centers. (Training, however, must be balanced with other services.) The program should exploit its opportunity to break new ground in developing training programs that are tailored to the needs of small firms and their employees.

8. In all activities involving transfer of technology from commercial vendors to small business clients, the centers must be objective, recommending commercially-available products solely on their technical and economic merits. This is particularly important in cases where vendors have donated equipment or software to the centers for use in training and demonstration facilities.

Financial Support for the MTC Program

Our study established one basic financial rule: *Centers must have stable funding to provide a platform from which they can concentrate on the delivery of services.* Our interviews with center and MTC program managers convinced us that the primary financial problem facing the first three centers is the uncertainty of both MTC program and matching funds, not the level of MTC program funding. The centers are using precious management time to pursue short-term financial survival, when, in our opinion, this issue should be largely decided before the centers are established.

We recommend the following measures to alleviate this problem. First, the federal government should make multi-year financial commitments (recommendation 1 makes this retroactive to existing centers and recommendation 2 extends it to new centers). Second, evaluations of proposals for future centers must give considerable weight to local support, financial and otherwise (recommendation 3).

1. The federal government should extend financial support to the three existing centers through the full six-year schedule, provided that they receive satisfactory third-year evaluations. As we have said before (4), this is the minimum commitment that will allow a meaningful evaluation of the program.

2. The Department of Commerce should work toward a budget mechanism that will ensure six years of funding support to all new centers that receive positive third-year evaluations. This commitment by the federal government will give the centers more credibility with small businesses and state and regional

agencies, facilitate hiring highly-qualified staff, and encourage long-range planning.

3. NIST should establish additional centers on the basis of committed state and regional financial support as well as technological competence, which alone cannot guarantee the survival of a center. Strong support by state and regional industrial development agencies will not only provide funding during the crucial startup phase of the centers, but will increase the likelihood that centers will become integral parts of long-range state and regional development strategies.

After a development period supported by stable funding, centers must become financially independent from the MTC program. We believe that this is an important aspect of the program (4, below), because centers that cannot obtain financial support from clients and from state/regional agencies (5, below) are unlikely to be effective.

4. The MTC program should remain an incubator for centers that can become self-supporting. The centers have expressed concern that finding other funding sources will be difficult; however, this is a problem that they, not NIST, must solve. Centers must develop sound business and marketing plans, aggressively pursue new funding sources, develop income-generating programs, and resolve problems that hinder funding by state agencies.

5. The centers should encourage clients and their business networks and councils to make government officials and state/regional development agencies aware of the value of the technology assistance that the centers provide. Satisfied companies are the centers' best advocates.

Future MTC Program Evaluations

Many interested parties, including the Congress as well as manufacturing associations and professional groups, are following the progress of the MTC program closely. Some organizations intend to conduct their own reviews. While the program welcomes their interest, discussions with both the centers and the program management at NIST made clear to us that *several independent formal evaluations will be a severe burden on the centers and will divert their attention from client services. As a result, we strongly recommend that further program reviews and formal center visits should be deferred pending the thorough third-year evaluation mandated by the Trade Act*. That evaluation, discussed below, should satisfy all interested parties.

Formal Third-Year Review

The Trade Act calls for an evaluation of each center during its third year of operation by a panel appointed by the Secretary of Commerce and chaired by an official of NIST. The consequences of this review are serious: if a center has not performed well, the Secretary is directed to terminate its financial support after the third year. Withdrawal of funding and the perceived stamp of disapproval will erode support from other sources as well, and would almost certainly result in the center's closing.

As a result, the evaluation must be thorough and impartial. A highly-qualified evaluation panel should be selected from among, for example, small business leaders, state and regional development officials, technology development and transfer experts, and representatives from manufacturing associations and professional societies. Once the evaluation panel is selected, we recommend that it consult with other interested parties in the business and technology communities to elicit their concerns and questions for inclusion in the review.

The Visiting Committee on Advanced Technology has followed the MTC program closely. For that reason, we suggest that Committee involvement in the evaluation process is appropriate, through regular or liaison membership on the evaluation panel. The full Visiting Committee, as NIST's principal private sector policy advisor, will study and comment on the evaluation panel report.

References

1. Megan Jones, "Helping States Help Themselves," *Issues in Science and Technology*, Fall 1989, pp. 56-60.

2. Stuart A. Rosenfeld, "Regional Development, European Style," *Issues in Science and Technology*, Winter 1989-90, pp. 63-71.

3. Simon Ramo, *The Business of Science*, 1988, p. 211-12.

4. The Visiting Committee on Advanced Technology, "Strategies for the Department of Commerce in Technological Competitiveness," Report to the Deputy Secretary of Commerce, August 1989, page 5.

APPENDIX A: MANUFACTURING TECHNOLOGY CENTER PROFILES

GREAT LAKES MANUFACTURING TECHNOLOGY CENTER

Origin/Foundation

A division of the Cleveland Advanced Manufacturing Program (CAMP), a well-established technology transfer operation in Cleveland, Ohio supported by the Ohio Edison program.

Operations

Staff: Organized, full-time, in-house staff.

Business, marketing operations: General marketing supplied by CAMP. Direct marketing done by GLMTC staff.

Primary technology sources: In-house applications engineers, vendors, outside consultants and experts (other sources include Cleveland State University; Case-Western Reserve University; NIST).

Types of direct technical project support: Modern manufacturing techniques, shop floor practice.

Other primary services: Training, networking of industrial clients, workshops, shop floor demonstrations, tailoring commercially-available technology to small companies' needs.

Client Base Profile

General description: "Rust-belt" industrial region with over 6000 small companies in the greater Cleveland area, working vigorously to improve its competitive position. CAMP and the Ohio Edison program have built an industrial network and support infrastructure that is distinctly more advanced than in the SMTC and NEMTC service regions.

Geographic distribution: Concentrated, mostly urban.

Technical sophistication: Most companies are proficient in basic manufacturing skills but use outdated manufacturing methods; narrowest range among the three centers.

Funding (From MTC Program: $1.5 million in 1989; $2.9 million in 1990)

Status: Strong support from Ohio.

Income from client support to date: Modest.

Leverage to Date

Early stages of contacts with other states; promotion of industrial networks; contacts with large number of companies; good assessment tools with general applicability (now working on computer version).

NORTHEAST MANUFACTURING TECHNOLOGY CENTER

Origin/Foundation

Division of the Center for Manufacturing Productivity and Technology Transfer at Rensselaer Polytechnic Institute (RPI), in Troy, New York.

Operations

Staff: Part-time staff from Rensselaer and Hudson Valley Community College (HVCC), some paid full-time staff, students.

Business, marketing operations: University resources; uses HVCC and New York State extension service; some direct outreach activities.

Primary technology sources to date: In-house researchers; vendors; NIST.

Types of direct technical project support: Advanced technology (robotics, computer-controlled processes); modern manufacturing techniques.

Other primary services: Training, workshops, shop floor demonstrations, reduction to practice of advanced laboratory (non-commercial) technology.

Client Base Profile

General description: NEMTC has chosen to begin work with relatively progressive small businesses, including established and start-up companies.

Geographic distribution: Mixture of rural and urban; much more geographically dispersed and thus less organized than in Cleveland.

Technical sophistication: Intermediate to advanced (more technologically sophisticated on average than those served in Cleveland or South Carolina). Companies assisted range from high-tech venture capital start-ups to progressive manufacturing operations that are aware of advanced manufacturing technology and want to implement it.

Funding (From MTC Program: $1.5 million in 1989; $2.9 million in 1990)

Status: Some New York State support (tenuous); now developing supplier certification programs as a source of revenue; some money from other states.

Income from client support to date: Modest; substantial income projected within a year.

Leverage to Date

Early stages of contacts with other states (Maine and Massachusetts).

SOUTHEAST MANUFACTURING TECHNOLOGY CENTER

Origin/Foundation

Newly-established program headquartered at the University of South Carolina in Columbia, SC and affiliated with the state's two-year technical colleges.

Operations

Staff: Management and administration at University of South Carolina; project staff at university and technical colleges.

Business, marketing operations: Technical college network used for publicity and contacts; survey of all small businesses in South Carolina underway.

Primary technology sources to date: In-house applications engineers, vendors.

Types of direct technical project support: Widest range among the centers; encompasses basic shop floor practice, modern manufacturing techniques, and robotics technology

Other primary services: Training, workshops, shop floor demonstrations, tailoring commercially-available technology to small companies' needs.

Client Base Profile

General description: Traditionally agricultural area with many new companies (both transfers and start-ups); fragmented industrial base (very little industrial networking among small companies).

Geographic distribution: Dispersed, highly rural.

Technical sophistication: Widest range among the three centers, from unsophisticated to advanced. Clients often need baseline training in manufacturing practice and help in modernizing shop floor operations.

Funding (From MTC Program: $1.5 million in 1989; $3.0 million in 1990)

Status: Strong commitment from South Carolina state government.

Income from client support to date: Low.

Leverage to Date:

Contractual relationship with Southern Technology Council to maintain representatives in other states in service region.

APPENDIX B: MANUFACTURING TECHNOLOGY CENTER CASE STUDIES
(Furnished by Centers)

SOUTHEAST MANUFACTURING TECHNOLOGY CENTER

TCM Manufacturing USA, Inc.

TCM Manufacturing USA, Inc. is a new manufacturing company located in West Columbia, South Carolina. In the summer of 1989, TCM approached the SMTC and requested their assistance in studying the feasibility of incorporating robotics into its production of lift trucks. The firm was considering three areas for possible automation: robotic welding of steering axles, main frame, and mast components; robotic painting; and Automatic Guided Vehicles for assembly line operation and material delivery. After an assessment of TCM's facilities, SMTC began a study of robotic welding in the steering axle area.

Because one of the major factors in the success of a robot installation is the integration of the robot workcells with the existing workforce, it is important to involve, from the start, the people who will be working with the robot workcell. Consequently, SMTC's first action was the formation of a management team consisting of the material manager, shop floor supervisor, and the welders. Working with the TCM management team, SMTC conducted a detailed application analysis of the welding robot, planned and engineered the robot workcell installation, and performed an economic assessment. This work indicated that the robotic workcell would yield better and consistent welding quality, production flexibility, a production rate three times that of the manual operation, a short payback period of only one year, and almost a 100% return on investment. As a result, TCM put the workcell into its 1990-91 capital budget and expects robotic welding operations to begin in early 1991.

TCM's General Manager, George Windish, credits SMTC's contribution to the firm's improved status:

> I can safely say that if we had not had the expertise and facilities of SMTC, TCM would not be in the technological growth position it's in today. Most small businesses such as ours, with small capital improvement budgets, cannot afford the cost of the expertise or model development technology, which was provided by the Technology Center, to confidently and effectively enter into CIM activities. In our case, which I am sure is the case in many other small companies, the time required to do a comprehensive study just isn't available with operating staffs, so you must seek consultant support in order to consider new technological growth and development. Consultants often are cost prohibitive and projects are dropped or delayed. I feel sure our project would have been delayed at least twenty-four months without SMTC's enhancement.

Piedmont Dielectrics Corporation

Piedmont Dielectrics Corporation is an electro-mechanical components manufacturer employing approximately ninety people. SMTC's interaction with PDC began in June 1989 when the firm requested training and assistance with implementation procedures for its recently-purchased ASK Software. PDC also requested design optimization for one of their products, a transformer consisting of wire, core steel, and insulation components.

SMTC organized training for the ASK software and assisted in the full implementation of the system. Arrangements were made with University of South Carolina Engineering faculty to provide Auto-Transformer Design Optimization. Also, a Total Quality Program was initiated in April 1990 and is progressing rapidly. Finally, within the last year, with the assistance of SMTC, PDC has been able to network with NASA-STAC for information searches on resistors and capacitors, with Michelin Tire Corporation as a supplier on a Sole Source Contract for epoxy castings, and with the Los Alamos National Lab for testing components. In addition, the firm was contacted by ASEA Brown Boveri of Sweden to discuss a possible new business venture.

Consequently, PDC has been able to extend its operation to a national as well as a European market, thereby making a step toward improving the competitiveness of the region as well as that of PDC. As PDC representative, John Wetherill, indicated, "In our ceramic development area alone, we will be able to add 5-10% of our gross volume in business over the next five years simply because of the contacts we've been able to make through SMTC."

NORTHEAST MANUFACTURING TECHNOLOGY CENTER

Unico Special Products

Unico Special Products, located in Newburgh, New York, is a maker of Corian and laminate countertops and vanities. The 27-employee company had sales revenues of $2.4M in 1988.

In order to eliminate a manual sanding process, Unico purchased a 5-head computer numeric controlled (CNC) Shoda router and a personal computer (PC) based Computer-Aided Design/Computer-Aided Manufacturing (CAD/CAM) system. However, due to the amount of time required to input a design into their CAD system, Unico rarely used it, opting instead to program the CNC router directly. This method greatly reduced the utilization of their router.

Unico contacted NEMTC with a goal of reducing order-to-delivery lead time from 3 weeks to less that 1 week to protect their 85% market share. NEMTC, through the services of Hudson Valley Community College (HVCC), enhanced and integrated Unico's CAD/CAM system, using their existing hardware and software. This has enabled Unico to increase utilization of their router and eliminate the manual sanding operation. As a direct result, Unico has reduced the time required to produce a custom countertop or vanity. The enhanced system also gave Unico the capability to produce new product styles, further securing their market position. The impact of this project on Unico is estimated at $200,000.

The software enhancements implemented for Unico offer promise for application elsewhere; NEMTC intends to extend usage of this software to other client sites.

Precision Autoparts, Inc.

Precision Autoparts, Inc. is a 19-employee business in Schenectady, New York that specializes in remanufacturing alternators and starters for automobiles and for heavy duty and industrial applications. They presently remanufacture approximately 600 electrical units per week and would like to increase their volume by a factor of five.

Precision Autoparts contacted NEMTC seeking support in attaining this goal. NEMTC established the following project objectives:

- o design a more efficient layout of the current facility
- o perform a capacity analysis
- o determine what additional resources are necessary to achieve the production goal
- o create an efficient layout of a higher-capacity facility

A modified layout of the current facility showed that a 53% reduction in material handling can be achieved by focusing the layout around two manufacturing cells, one for each of the electrical products.

The study of capacity requirements indicated that a higher-capacity facility will require the purchase of new equipment such as lathes, hot wash machines, bead blasters, and paint booths. The factor limiting production expansion was determined to be the paint booth, which is currently operating at 74% of capacity. Beyond increasing the throughput from the existing paint booth, additional booths are required to achieve the higher capacity goal.

A layout and detailed job design was created for the high volume facility. This facility design, as with the modified current facility, is focused around two parts families. A detailed job design was created using work teams because they can best maintain a high level of quality and job satisfaction.

Implementation of the project recommendations will begin after Precision Autoparts completes an internal reorganization and investigates sources of funding assistance. The impact of this project on Precision Autoparts is estimated at $200,000.

A software package called CRAFT was used to facilitate the layout portion of this project. NEMTC has established standards for the use of this package in subsequent facilities planning projects.

GREAT LAKES MANUFACTURING TECHNOLOGY CENTER

J. W. Harley, Inc.

J. W. Harley, Inc. is a privately held 70-employee company that makes components for large utility power transformers. A sensor technology originally developed at Sandia National Laboratory in Albuquerque has been transferred from the laboratory to CAMP's Sensor Technology Center using the GLMTC as an intermediary agent.

Sensor Technology Center technical staff are working with J. W. Harley to refine the product for commercial use and develop cost-effective and reliable production processes. The product represents a technical breakthrough aiding in the prevention of electric utility brownouts and blackouts. Expected revenues once in production are expected to be $5 million in year 1 and $10 million in year 2 with further growth possible depending on competitors' responses -- especially in the international market.

Bessam-Aire/Accuspray Inc.

Bessam-Aire/Accuspray Inc. is a privately held 65-employee company making high volume, low pressure air paint spraying equipment and general air-handling equipment. Low pressure air spraying is a new, rapidly-growing market fostered by California environmental legislation. The company has been licensing a French design which satisfies the environmental restrictions but has production and end-use difficulties.

The GLMTC, using its own resources and those at CAMP's Advanced Manufacturing Center, has worked with Bessam-Aire/Accuspray to redesign the product and its method of production significantly. This work has resulted in a lower-cost product with superior performance that still meets the environmental restrictions. Expected sales of the new product are $2.5 million in year 1 and $5 million in year 2. Sales could also grow dramatically from these levels if the environmental legislation spreads from California.

Mr. **Valentine**. The Japanese seem to be targeting these companies that have invested in such processes. Do you have any suggestions or any advice to us as to how these companies can acquire capital without being bought out by overseas investors?

Dr. **Bement**. This has been a major concern for us. We see American companies forming alliances or partnerships to help prevent this.

Mr. **Valentine**. The Administration has decreased or eliminated funding for NIST's external programs, such as the Regional Manufacturing Centers we were just talking about, and the State Extension Program.

If you could distribute or redistribute a 15 to 20 percent increase across NIST, what would your priorities be with respect to these centers and these State Extension Programs?

Dr. **Bement**. In order to answer that question, let me first make a point.

The internal program, or the initiatives, that are proposed in the budget are also outreach programs for the most part. They focus on industrial segments and on the standards and technologies that those industries or those segments require. And much of the industrial outreach, or the transfer of technology as well as "know-how," occurs as much through the initiatives program as it does through the outreach programs under this Trade and Competitiveness Act.

But I think the key here in the redistribution is to be sure that those two parts of the program are in balance. So I would certainly focus that increase on the initiatives programs, on the Manufacturing Technology Centers, and on the Advanced Technology Program.

Two of those activities—namely, the initiatives and the Advanced Technology Programs—really address emerging technologies for new markets that have great global potential. The manufacturing technologies, in addition to providing some support for emerging technologies, really support much of our core industry or core manufacturing centers, and continue to keep those industries competitive.

I think we have to take a balanced strategy approach, to focus not only on the emerging industries and technologies, but also on the core industries and technologies as well.

Mr. **Valentine**. In your statement, Doctor, you mention that the Visiting Committee believes that NIST could be preeminent in commercial technology if the Federal Government provided the resources necessary for that to happen. Would the Administration's proposed doubling of NIST—for instance, over the next five years—achieve that objective, in your opinion? And what areas of NIST are in special need?

Dr. **Bement**. Yes, sir, I think it clearly would. As we begin to reshift our long-term priorities and begin to implement, in addition to a science policy, a technology policy which we really haven't had before, I think we have to begin rebalancing our investment from the Defense sector, back into the commercial sector. The best way to do that would be to put more resources into the NIST program; not only the internal program, but also the Extension Program.

I would hope that in addition to seeing the 1996 appropriation twice what it is today, that over that period of time we would see the Advanced Technology Program come up to the levels identified in the new authorization bill, as well.

Mr. **Valentine**. How responsive has NIST been to recommendations made by your Visiting Committee?

Dr. **Bement**. We've had complete and full cooperation, not only by the senior management within NIST, even in cases where we asked for almost unreasonable demands, but clearly from Secretary White and his staff, we've had full cooperation.

We have been very probing, as a committee, first of all in assuring that there was not only accountability in the NIST program, but also to get the NIST message out to industry at large, especially to senior executives in industry. In that effort we share a common goal with Secretary White in really trying to make NIST more obvious and more visible and more accessible to senior executives within industry.

Mr. **Valentine**. Thank you, sir.

I have a lot of other questions, but I don't want to hog all the time.

Mr. Lewis?

Mr. **Lewis**. Just one question, Mr. Chairman.

Doctor White, I recognize, and most all agencies make this statement, that your budget is already prioritized, but if you had to take a $25 million reduction in your budget, would you cut it across the board or would you specifically look at areas that you would cut out and just stay with some of the areas that you have? Do you have those prioritized if you had to take any type of a cut?

Dr. **White**. I think we did go through a prioritization, and we would go back and go through that prioritization again.

Mr. **Lewis**. Okay. Thank you, Mr. Chairman.

Mr. **Valentine**. Thank you.

Mr. Thornton?

Mr. **Thornton**. Thank you, Mr. Chairman.

Pursing the excellent line of questioning of the Chair with regard to the non-energy-related invention program in the Technology Extension Program, I want to spring from that to whether diverse Federal patent policies remain somewhat of a problem in spurring innovation where patents are not governed by the same uniform patent law.

A few years ago, Doctor Betsy Acker Johnson and I drafted a proposal to make uniform the Federal patent policies. It went through as far as universities concerned. My question is really whether that needs to be looked at again?

Dr. **White**. You refer to within the Federal laboratories?

Mr. **Thornton**. No, I'm talking about a broader spectrum than that. The bill we proposed was to sweep across all Federally-funded research, wherever it occurred, and to assure that the results of that research could be used by enterprises with patent protection on the inventions on the theory that a public patent that is free to all is worth nothing to anyone and, therefore, many inventions lie on the shelf.

Dr. **White**. It is certainly true that the fact that Federal employees can now obtain patents and, in return, award exclusive licenses has provided a tremendous incentive to commercializing Federal R&D technology.

Mr. THORNTON. Good.

Dr. WHITE. The statistics do show many, many hundreds of cooperative arrangements now underway that would not have occurred if it were not for that kind of protection. However, I think as you point out, there are many different kinds of Federally-funded research efforts; there are laboratories managed by universities, there are laboratories managed by industries, there are internal laboratories. They still do have a variety of different policies, and that, I have been told by people in the industrial sector, is confusing, at best. We are trying to address that as part of our commercialization effort to try to standardize that program across all the sources of R&D technology.

Mr. THORNTON. And pursing also the question of the difficulty in gaining interest in a new invention by American companies—and I like the idea of a vertical integration according to size of company as being a method of achieving that. I have a particular instance with which I am aware in that the university that I headed had, as part of the experimental program to stimulate competitive research, which that university benefitted from, had the unusual experience of scooping the field in the world's highest temperature superconducting material when Doctor Alan Harmon and his colleague, Doctor Chang Jiang, at the University of Arkansas, developed the thallium-based compound which still holds the world's record for the highest temperature superconducting material. I regret to say that as we sought to interest people in commercializing this invention, we found a great deal of interest from Japanese companies and virtually none from American companies. Maybe we didn't know how to pursue it, but is this something that is found in other areas of invention?

Dr. WHITE. I think it is. I think that the problem there is that one looks, for example, at the process technology that has to be developed to take that particular compound and make a useful film or conductive wire out of it is going to take about ten years. The cost of capital and other inhibiting factors today make it very difficult for people to launch into something like that. That's why you are encouraging them to share that list by forming consortia and trying to take a longer term look.

Mr. THORNTON. Don't we, indeed, have a climate in this country that causes managers to focus on short-term profits as the goal, and makes little room for managers who look downstream at what the long-range effect of that focus will be?

Dr. WHITE. I think you are absolutely right. In fact, the Industrial Research Institute did a survey of its members recently to ask them what they felt was the major contributing factor to our lack of competitiveness and that came out first.

Mr. THORNTON. Doctor Bement, I noticed you smiling. Would you like to add your comments to that?

Dr. BEMENT. Well, I am glad he brought that study up because it was commissioned primarily by the National Science Board to try to understand why the R&D investment in the United States was beginning to plateau out, which is a great concern to us. We did poll the IRI, the Industrial Research Institute, and we brought to their attention about eight possible causes with all types of subcauses within that spectrum. We thought that Federal technology policy would rank up near the top. Well, it turns out they were almost equally important, but the one that was picked out as being perhaps the most critical factor was the short-term thinking and management of corporate CEOs and executive managers.

Mr. **Thornton**. It seems to me that we should give some attention to the question how do we change that climate as well as how do we develop new institutions and new agreements that we try to bridge our way around the climate. Your input and suggestions as to ways we might approach that would be much appreciated.

Dr. **White**. I think that's a very complex problem. I think, as Arden said, that when you ask a whole group of people, you are going to get a whole lot of different answers.

I was out to visit a large computer company recently and spoke to their CEO and asked him that question. His answer was cost of capital. He said that if the cost of capital is high, I have to think short term. It is very simple. If the cost of capital gets lower, then I can afford to think longer term.

On the other hand, we held a workshop recently that the Technology Administration sponsored on the financing of technology and there was a lot of debate about that issue. So, it is a very complex macro-economic environmental issue. I wish there were a simple answer, but I don't think there is.

Mr. **Thornton**. I am certainly not looking for a simple solution. H.L. Mencken once said, "that to every complex and difficult problem there is a simple answer and it is wrong." We recognize that it will require a great deal of complexity.

I want to thank you very much for your testimony, Mr. Secretary. I'm looking forward to working with you.

Mr. **Valentine**. Thank you, sir.

Mr. Gilchrest?

Mr. **Gilchrest**. Thank you, Mr. Chairman.

Doctor White and Doctor Bement, you've mentioned today about fostering new technology, creating new visions for the future, and your words about Manufacturing Technological Centers and networking are encouraging to me. You've mentioned taking full advantage of our technological base, not trying to duplicate things that are being done, and trying to share managing techniques with a variety of agencies. The question I have is when you are looking to do all these things, another avenue possibly would be those military facilities, especially labs, that are in the throes of being phased out or just closed.

What are the possibilities of looking into military laboratories that have good efficiency ratings, excellent records of production and success; looking at those military facilities in an evolutionary way to possibly become part of this joint industry venture that you've referred to as a chance for expanding our base, especially not duplicating high tech industries that have already taken place, ensuring some stabilities in those communities that have so long depended on that particular military lab. I just wondered if there was anything in the works that might deal with something like that?

Dr. **White**. Yes, there is. We are working very closely with DOD. Not only are we working with Assistant Secretary McMillen on standards, what we'd like to do is develop compatible standards, get rid of no spec standards so that we can have the same standards in the defense industry as well as in the non-defense industry, for example. We are working with that same organization to explore the possibility of using its arsenals, which have, in fact, very advanced manufacturing technologies, and making that available to small and medium size manufacturers to come in and, if you like, rent manufacturing capabilities. We are working with them on a variety of issues that, again, deal largely with changing Defense regulations that make it easier for the private sector to deal with them and become more effective in utilizing and transferring technology that is cooperatively developed.

Mr. **Gilchrest**. Thank you.

Dr. **Bement**. If I can touch on that. As I am sure you know, the DOD laboratory system is going through a great deal of consolidation at the present time. The whole tech base, R&D system within the Department of Defense will be much more concentrated as time goes on because one really can't support as many installations as there are currently in place.

Another factor is that much of the R&D program within the Department of Defense is an extramural program, not very much of it is intramural; and some laboratories really don't have that much of an intramural program. So I think one would first have to ask are these really the best alternatives among all the various alternatives for supporting industry in research and development.

Secondly, how modern are they and are they really equipped with modern research equipment that industry really needs.

Mr. **Gilchrest**. Well, I was thinking of one in my district. I know this is a little bit parochial, but there is a facility in my district that—

Dr. **Bement**. That's why I am answering your question rhetorically, because I suspected that.

Mr. **Gilchrest**. This particular facility, its efficiency rating, as far as the military is concerned, is the highest in the country as far as electrical engineering and things of that nature. It may be phased out and consolidated with another one in another State. Some of the people that are working at this facility simply won't move; they would prefer to retire or find something else in the area. So there are some of these better labs in the country that have such a high rating even among the military but the cost-cutting makes it necessary to consolidate them with some other facility that is much larger. I would be happy to send you some of the information.

Dr. **Bement**. No, no, Congressman; I know which facility you are referring to and I know it very well. I have to say that most of the research that is being done in that facility is dual-use technology. I think that particular case is a good one and that much of the facilities there are modern and the research that is being done is of great interest to industry.

Mr. **Gilchrest**. Is it possible that a facility like that could in an evolutionary sense be phased out from the military — because of its turning down contracts, they can't take all the contracts that they are offered—and somehow be commercialized and phased into the private sector?

Dr. **Bement**. I think it is quite possible and, again, it depends on how the resources that go to support that laboratory can be leveraged between Federal, State, and industry support in order to make it viable. But I think also for the facility to continue to stay at the cutting edge, it has to be dynamic and the staff has to turn over, it has to be flexible, and it has to change its programs as well as its facilities, and so forth, not only to anticipate change, but also carrying on cutting edge research that makes change possible. And that's a daunting task, as you know.

Mr. **Gilchrest**. Thank you, Mr. Chairman.

Mr. **Valentine**. Thank you.

Mr. Roemer?

Mr. **Roemer**. Thank you, Mr. Chairman.

My colleague was a little bit bashful about being parochial; I'm not going to be. I just spent ten days in my district and I just want to bring up a couple of things that I ran into, some of it may be relevant, I hope it is, and other parts of it maybe you can just comment on in terms of your expertise and knowledge and give me some feedback to take back to the district as well. I hope this relates to some of my other colleagues' problems, that it isn't so parochial that it only relates to me and northern Indiana.

In your testimony, Doctor White or Doctor Bement, I think you both talked about the Total Quality Management Awards. I was just at a plant in my district that manufactures the Hummer, the HUM-V. They have just received one of these awards and they are now mentioning, and not afraid to mention, the Baldrige Award in the same breath, saying that they are making some great progress and they are very proud of the quality of their product. I can tell you that it makes me very proud to walk the assembly line and talk to people and see them now talk about the possibility of receiving this award as well. I would just like to mention it first of all just to tell you that that is improving the quality of our products. I met with both management and labor in the same room. They both exchanged ideas on improving the quality, which I am very, very excited to see that working relationship.

I guess I would just like to ask for your comments first of all on that Baldrige Award, ways by which, as you both alluded to, that we can improve access to other companies throughout the United States to have an opportunity to win that award, and what we can do to improve access?

Dr. **White**. I think the success of the Baldrige Award is just unbelievable. I think last year we sent out about 45,000 guideline packets and this year it was 180,000. It is just growing at an enormous rate. I think that one of the things to me that is very exciting about this, an aspect of it that I think a lot of people under-appreciate, one of the requirements when you win the Baldrige Award is that you help other companies in their quality effort as well. And what we are seeing now as we build up a number of Baldrige Award winners is that they themselves are networking. Everybody is out helping everybody; Xerox helped IBM, now IBM is starting to help others, Motorola spends enormous amounts of money trying to help other companies. As they begin to learn that they can cooperate in quality, I think they will learn that they can cooperate in other areas of technology as well. So I think that in the long term there is going to be a benefit that is even far beyond the quality aspect of it.

Mr. **Roemer**. Thank you.

Dr. **Bement**. If I could comment on that. There is so much more to total quality management and what the Baldrige Award is causing in U.S. industry than is probably generally known. One of the reasons why many companies are short-term oriented is that their productivity has not really kept up with the marketplace and with international competition, so the margins have been squeezed, the fixed costs have stayed pretty much the same, and with declining flexibility, they must focus in on the short term. The way to get a more strategic outlook and to take a longer term posture and to invest in R&D is to free up resources and the best way to do that is through productivity gain.

Now that's exactly what total quality management and the Baldrige Award is allowing to happen in many U.S. companies across the country. And it is key not only to getting total employee involvement in the process and a closer participation by organized labor with management in making all this happen, but it is having a dramatic effect in some corporations in increasing the flexibility of resources for capital investment and also in R&D investment.

Mr. **Roemer**. Talking about quality is becoming the key word and, as I meet with labor and corporations throughout my district, also "teamwork" and "partnerships" are becoming some of the buzz words that we see.

I have nine institutions of higher learning in my district in addition to a number of junior colleges and so forth. What advice can you give to me to see this partnership and teamwork and networking between the universities and the businesses; i.e., LTV, which is the Hummer plant, working with IUSP, Indiana University-South Bend? They are trying to forge some new working relationships there. What advice do you have for both the university and the corporation, and what can I take back to some of these other universities to encourage this, as you mention in your testimony, that you point out for our National labs as well?

Dr. **White**. I have initiated a national Outreach to Universities Program. Basically,, what I am trying to encourage among the universities is a recognition of the fact — and the quality issue is part of it, but it is the whole issue of manufacturing and the fact that the manufacturing paradigm has changed. We're not manufacturing today the way we were even ten years ago. This new manufacturing paradigm sometimes goes by the name of "Lean Production."

What the universities can do—

Mr. **Roemer**. What is it again, Doctor White?

Dr. **White**. Lean Production. It is the flexible approach to manufacturing, it is quality, it is just in time, it is using technology to your advantage, it is getting away from the very narrow skills base that we used to have with a whole array of different categories for workers, but making people flexible, making the whole process flexible. It is all of these things. So we are trying to emphasize that the universities in their engineering schools and in their business schools help us propagate that concept among all of their students.

We are also asking them basically to be aware that we are now on a global economy and that technology is going to come from the rest of the world as well, so they should be looking at other sources of technology and taking advantage of those. I think the universities are in an ideal position to encourage students and faculty to go abroad. There are many programs that provide funding for that. The Japanese are providing a great deal of funding; they will pay your way over there, they will pay a salary. There are a lot of opportunities and we are encouraging universities to look at these.

Then we come back to one of my favorites—metric. I think the universities can help us with that metric problem. Metric literacy should be required of everybody who comes out of college.

So those are the messages that I would take back to the universities.

Dr. **BEMENT**. I would like to answer that question from a somewhat different perspective. I don't think any university wants to be treated as a paid up laboratory or the faculty be looked upon as problem-solvers. I think the most constructive relationship between industry and universities occurs when there is a high quality research activity also occurring in industry, where there can be a peer interaction or a peer coupling that's of benefit to the university investigator as much as it is to the industry investigator. These two-way partnerships, I think, is where one has to begin.

I'm going to be very much interested, and I am sure will my colleagues on the Visiting Committee, to examine the Advanced Technology Program as it begins to mature to be sure that there is some type of interaction with universities as a result of that program, and to be sure that we're coupling not only technical insight through the industrial part of the program, but also drawing on scientific insight as well from universities that can contribute. I think bringing those two insights together is where one can really get synergy and begin to move very rapidly in bringing new products into the marketplace.

Mr. **ROEMER**. Thank you, Mr. Chairman.

Mr. **VALENTINE**. Thank you, sir.

Dr. White, we will have a series of questions on metric which we will take the liberty of submitting to you. If you would write us some answers, we would appreciate it.

[The prepared questions to be provided follows:]

METRIC QUESTIONS

QUESTION 1:

What is the state of governmental metric conversion? How far will conversion have progressed by the end of 1992? What further governmental efforts are needed to assure that the Metric Usage Act is fully implemented? Are there agencies who are models of metric conversion that would be useful to other agencies? Are there any unanticipated problems to date associated with conversion that need to be addressed legislatively?

ANSWER:

Most Federal agencies already use metric units in scientific or international operations, so we are concerned with the initiatives to change remaining inch-pound usage to metric usage in ways consistent with the amended Metric Conversion Act. The degree of metric usage, which can be achieved by the end of 1992, however, deserves some definition.

The law requires metric usage in grants, contracts, other business related activities and publications, subject to important qualifications regarding practicality, etc.

There are several levels of metric usage in each of these categories. For example, we can simply speak the language of metric as all other countries do. That is, we can direct that the written and spoken measurement terms used by Federal officials in the categories above be metric, irrespective of whether the item procured or other subject matter has made any actual physical transition to metric.

This is referred to as "soft" metric conversion and could be implemented extensively by 1992. Although some may regard soft metric conversion as superficial, extensive Federal soft metric usage would raise the level of awareness of the new policy of preference for metric in U.S. trade and commerce and stimulate various industry sectors to work with each other and with their public and private sector customers to achieve new hard metric usage.

We should weigh the benefits and costs of soft metric transition. The cost of training the Federal work force to use metric units, and possible inconvenience for agency suppliers and clients must be considered, but broad based soft conversion can get the attention of all concerned more rapidly than slower "hard" conversion. We will have to be sure the agencies are prepared to apply adequate resources to train their employees and prepare all other parties affected by the change in order to make a smooth transition and avoid a counterproductive backlash. The time required to budget for and carry out such a change could, however, go beyond 1992, even with firm leadership within the agencies and strong support by key committees in the Congress. I would therefore like to have a clear understanding of the interest and support we can expect from this Committee for our advocacy of broad based soft metric usage by the Federal agencies.

With respect to metric usage in grants, we expect that agencies will be able to require that applications for grants as well as data, reports, etc. generated under new grants be metric by 1992. The National Science Foundation, for example, already requires metric usage in grant applications.

In contracts and other business related activities, we will complete the development of planned regulatory and procedural recomendations this fiscal year and we are hopeful that the agencies will implement these recomendations in contract solicitations for bids and proposals by the end of 1992. I should point out, however, that there is no possibility that tens of thousands of existing measurement sensitive military and Federal specifications can be revised by 1992. This is neither necessary nor economically feasible. The agencies will focus on implementing requirements for metric for new designs for procurements where such designs are specifically for and traditionally paid for by the government. At the same time, we will establish a systematic process for carrying out consultations with industry to encourage voluntary introduction of metric in new commercial product designs and manufacturing and, where feasible, the manufacture of existing products as soon as economically feasible. Assistant Secretary Wince-Smith will provide more detail regarding our plans in this area in her response to Chairman Valentine's request for further elaboration on the description of our metric program presented in her testimony before this Committee.

Regarding agencies which are models of metric conversion, it is still too early in the process for accolades or criticism.

The new legislation amending our previous metric conversion statute followed what can be best described as a decade of uneven and ineffective effort in both the public and private sectors. The amendments were appropriate and should be effective if they are implemented conscientiously and we are willing to be a little patient with a process that is still largely voluntary and resource limited.

It is important to remember that the Trade Act metric usage provisions were not highly publicized. Also, their successful implementation depends largely on voluntary compliance by each Federal agency and, perhaps more importantly, on a long range perspective and statesman like response from industry to our encouragement of metric usage in the design of new commercial products. For much of U.S. industry the transition to metric usage is, after all, an investment cost to all but a select group of government suppliers. The challenge is to sell today's managers on making an investment to gain broadly distributed benefits for the benefit of future managers and for future economic benefits for our citizens.

Finally, it would be helpful if this Committee could encourage other Congressional committees to lend appropriate support for metric usage in their respective areas of responsibility.

QUESTION 2:

Do you know of governmental activities that will be exempted from conversion to metric? Why?

ANSWER:

I am not aware of any governmental activities which should be exempted from metric usage, except those which are clearly impractical or disruptive as provided for in the law. Even in such cases the "exemption" may be for a limited time or until some external condition is satisfied. Examples of presently impractical usage include areas where International standards and agreements -- such as feet of altitude in aircraft operation or nautical miles are used by international custom or agreement. But even here we should be alert to the opportunity for gaining an advantage for U.S. competitiveness as the agents of change in these external constraints. In all cases the overriding objective of changes to metric is either to gain the efficiency of operating on a single system of measurement units, or to conform to international market norms, or to gain both advantages. Where these benefits are not present, metric usage can be delayed, but not permanently "exempted".

QUESTION 3:

Does the Department of Commerce have up-to-date information on industrial conversion to metric? Is more information desirable? Does the Department collect any statistical information on metric usage in industry at this time? Could such information be collected by modifying existing DOC industrial data collection programs with minimal extra cost to the government or burden to industry?

ANSWER:

We have considerable anecdotal knowledge of metric usage in various industries, but it is far from complete. Despite much metric usage and total "conversion" of specific companies and some whole sectors, such as automobiles and farm equipment, our industrial infrastructure is still predominantly non-metric. More information about specific sectors or even specific firms would be interesting, but unless keyed to the industrial interdependency of various materials, supplies and building blocks the information would not be very useful. It has long been held that such information is difficult and expensive to collect - even using existing data collection systems. Also the data changes so rapidly that it is of marginal utility. We would far prefer to spend any additional resources made available to us for expanding our capability to provide outreach to state and local government and industry.

QUESTION 4:

Have agencies followed the conference report on the Metric Usage Act and established guidelines similar to DOD Directive 4120.18 of September 16, 1987? If not, would make the guidelines a statutory requirement increase compliance with this request?

ANSWER:

Only twelve of 39 ICMP member departments/agencies have issued appropriate guidelines. We have reminded the members of the importance of this step in the process of implementing their mandate for metric usage. Our ICMP report to this Committee will discuss this further. Making guidelines a statutory requirement is not advisable since issuance of guidelines does not necessarily assure either good implementation or a successful result in terms of beneficial economic impact. This is best handled within the Executive Branch. We are seeking more specific authority to deal with such leadership and management matters.

QUESTION 5:

In the early 1970s, then Secretary of Commerce Maurice Stans issued a report entitled A Metric America. A Decision Whose Time Has Come. Have you given consideration to updating this report or issuing another report to inform industry of the change in governmental use of metric and to outline the advantages for industry which converts?

ANSWER:

The 1971 Commerce Department report, "A Metric America" was an excellent comprehensive review of the metric issue and the state of metric usage at the time. It would be costly to update the report and really not necessary. The report was aimed at providing the data and rationale for a legislative initiative to fulfill the requirement in the Constitution for Congress to establish a system of weights and measures.

The original metric bill, which failed to pass on the floor of the House in 1973, followed the primary recommendations of the 1971 report. The Metric Conversion Act of 1975 was the product of a significantly weaker bill developed in a compromise with opponents of the 1973 Bill. The compromises and the bill which resulted did not serve the country well. The Metric Conversion Act of 1975, prior to its 1988 amendment, established an entirely voluntary program, which lacked specific objectives, failed to specify a time frame for accomplishment and effectively precluded the essential committed governmental leadership essential for success. The 1988 amendments of the Metric Conversion Act clarified the end objective, established a target date and sense of urgency and not only facilitates a Federal government commitment to leadership, but requires specific measurement usage.

In our view there is no need to re-study this issue at this point in time, unless some credible challenge to the need to implement the new policy of preferred status for metric in trade and commerce materializes. Frankly, I do not see how this could occur in the face of the overwhelming logic of the need to complete the U.S. metric transition. The challenge now is simply to get on with the process. Government and industry leadership cannot help being challenged by the opportunities and threatened by economic penalties of inaction.

QUESTION 6:

Are the states generally aware that the conversion is coming and that they will be asked to use metric when dealing with the Federal government?

ANSWER:

The renewal of formal communications with state government on the metric issue began in 1988 with letters to each Governor by then Secretary of Commerce C.William Verity. We know that the message of the new and important changes in the Metric Conversion Act was accepted with some skepticism in some states. This is understandable given the track record of a prior false start. The states got burned on metric education, for example, having prepared for a complete replacement of inch-pound units by metric units by 1985 only to find that the Federal government and industry had put metric on the back burner.

We are re-energizing our National Conference on State Metrication and will soon send our new Federal Metric Policy and other administrative and executive direction documents to the Committee for review and adoption as model state documents. We plan to encourage the Governors to review these documents and use them as appropriate.

We are also encouraging the Federal agencies to involve their state and local counterparts in their internal plans and in their dialogue and planning with suppliers and agency clients. This involves a great deal of consultation, but the avenues of communication are already there -- we simply need to be sure they are used effectively to promote metric usage implementation on a cooperative basis with the state agencies.

QUESTION 7:

Is any progress being made in metric education?

ANSWER:

We are not aware of any new metric education initiatives undertaken by the education community. As I stated previously, they got out in front in the late seventies and early eighties and were prepared to complete their transition, but frankly when government and industry failed to move forward to complete metric transition, many educators felt abandoned and resentful. We have some fence mending to do, and we need to do this urgently. I have expressed my concern about this to Deputy Secretary of Education, Sanders and we will be meeting to discuss what needs to be done at the Federal level to convince the education community that we are serious about leading the metric transition to a successful conclusion. We must convince them that they need to pick up where they were in 1985 and finish the job of transition to teaching measurement in the primary grades, using only the metric system and metric usage in all curricula in all of our Nation's schools.

QUESTION 8:

Given the Canadian Fair Trade Agreement, Administration interest in a Mexican Fair Trade Agreement, Japan's listing metric as a trade barrier under the Strategic Impediments Initiative, and the European Economic Community Directive which made metric units the only legal units of measurement in the European Economic community after December 31, 1989, what is the government doing to modify small business assistance programs to include assistance in adopting metric?

ANSWER:

I would respectfully defer to the Small Business Administration (SBA) and to the various agency small business specialists on this question. The SBA has recently developed its metric usage implementation plan and has agreed to chair our interagency council small business assistance subcommittee. I can say that our activities to date pose no threat or burden for small business. I know that there is concern about possible adverse impact and therefore a need for specific new positive assistance to small business, but I am inclined to accept the research findings of the U.S. Metric Board that metric conversion is not difficult for small business. Small firms accommodated metric transition in the auto industry with no apparent difficulty.

Large firms, which are customers and suppliers to small business and trade associations are very affective in assisting the smaller firms in the adjustments needed for metric.

QUESTION 9:

What role has metric played in coordination by the Allies in Operation Desert Storm?

ANSWER:

This is really a better question for DoD, but we have not heard of any horror stories about conflict of measurement unit standards in desert storm in either operational doctrine or in the weapon system and equipment compatibility areas. We were quite impressed by evidence in the extensive news coverage where metric units were used in both formal briefings as well as candid interviews of coalition officers and enlisted personnel. This is no real surprise as our NATO allies have had to anticipate these matters for many years and we obviously successfully integrated all of the coalition forces in a metric battle plan and an effective logistic support operation. I presume they are coping with all of the associated logistics as well. The Saudis and other Arab country allies in the war effort use U.S. or NATO weapon systems (aircraft, missiles, etc.) and presumably have compatible munitions and other expendable supplies.

Looking to the future, I hope U.S. firms will take advantage of the opportunity to use metric in the rebuilding of Kuwait. Saudi Arabia is very strict about metric usage and I assume Kuwait would naturally prefer that we use metric in all product and service transactions.

Mr. **Valentine**. On the question of the Baldrige Award, we are going to have a hearing later on in the year and get into all that. We probably should thank our lucky stars that it is successful and leave it alone, but we can't do that.

[Laughter.]

Mr. Ritter?

Mr. **Ritter**. Thank you, Mr. Chairman.

First of all, I want to commend our two witnesses for their excellent testimony. Doctor White, I welcomed you before. Doctor Bement, it is always a pleasure. We've worked together over the years, and I thought your testimony was rigorous and it was chock full of the right stuff.

Dr. **Bement**. Oh, gee.

[Laughter.]

Mr. **Ritter**. Yes. And I don't even have any connection with TRW.

Dr. **Bement**. You have got a lot of connection through M.I.T., Don.

Mr. **Ritter**. That's true. Let me ask a couple of quick questions here; I have three questions. One, the Administration has cutback on the Manufacturing Technology Centers. Your reviews of the Manufacturing Technology Centers have been pretty good.

One of your key points, point number two, is transfer, and that's a point I made in my opening statement. We have got a lot of stuff on the shelf that is already developed that's not out there. I guess capital is one reason but knowledge is another. What are your thoughts, I'd like to hear from both of you, on the fact that it has been cut back from $11.9 million to $10.3 million at a time when we're saying that the three main goals of the Technology Administration, one of which is transfer, and here is one of your prime elements to transfer.

Dr. **White**. I think that the reason for that is that we do have a carryover from this year.

Mr. **Ritter**. How much is your carryover?

Dr. **White**. It is $3.4 million. And so with the carryover and with what is requested, we feel that we can fulfill the obligation of creating two new Centers this year and a third—

Mr. **Ritter**. Okay. So that adds up to about $17 million — I'm sorry, $13.7 million.

Dr. **White**. To $14.3.

Mr. **Ritter**. Are $10.3 and $3.4—

Dr. **White**. That's $10.9.

Mr. **Ritter**. Okay.

Mr. **Valentine**. We'll have one of the interns add it for you so you can go on to something else.

[Laughter.]

Mr. **Ritter**. Well, this is Jim Greene's numbers—$11.9 to $10.3, okay. So, all right, let's go beyond that then. So you feel comfortable that the program has got what it needs?

Dr. **White**. I think that with this budget we can fund two new Centers and a third one—

Mr. **Ritter**. And we on the committee should not be aggressively seeking to expand beyond the—are we still in "proof of concept stage," or what?

Dr. **Bement**. May I respond to that. There is probably no one more interested in seeing their program grow rapidly as I am. On the other hand, we are at the mid-point exam for the first group of three. One of the key issues is whether or not there is going to be life after six for those first three.

Mr. **Ritter**. Life after six?

Dr. **Bement**. Yes, they are funded for six years and then they have to support themselves from that point on. So that's still an open question. I am sure that in the new Centers that are going to be selected that is going to be a more important selection point, a more important criterion.

I think also it is important to begin recognizing that even with six Centers you are not really going to have much of a national impact of what the end game is going to be. What is it you want to have in place when the whole program is up at steady state and operating nationwide? What is the role of the Centers going to be as nodes? What are the satellites going to look like? What kind of outreach programs do you need in order to cover the whole region? What type of cooperation do you need between the Federal Government and the State Governments through their own economic development programs? What kind of policies need to be put in place in order to make that whole network really effective, cost effective as well as getting all the leverage that you can— intellectually, geographically, financially, and so forth? Those kind of policies and that kind of planning has yet to be done. And until I think we see what the final picture is—

Mr. **Ritter**. Now your initial comments, however, is that some $88 million of financial impact has resulted from some $9 million of investment—$75 million in economic benefits from $9 million in investment. I think those—

Dr. **Bement**. Those are dramatic figures.

Mr. **Ritter**. Those are dramatic.

I think we're all sometimes leery about these kind of dramatic figures. If you can kind of lay out how you come by this, you know, in a not too detailed gigantic a document, that would be helpful to us because that's the kind of information that can be very important to people that sit where we do.

Dr. **Bement**. I think it would probably be most appropriate to submit that for the record, but we do have some information that I think would be helpful to the committee.

[The information to be provided follows:]

VISITING COMMITTEE ON ADVANCED TECHNOLOGY
National Institute of Standards and Technology

March 12, 1991

Honorable Tim Valentine
Chairman, Subcommittee on Technology
and Competitiveness
House of Representatives
Washington, DC 20515

Dear Mr. Chairman:

At the National Institute of Standards and Technology's (NIST) Reauthorization hearings before the Subcommittee on Technology and Competitiveness on February 26, 1991, I testified that small and mid-sized companies received about $75 million in economic benefits during the first 18 months of operation of the three Manufacturing Technology Centers, from a federal expenditure of about $9 million. For the record, I want to provide additional information on that statement, as requested by Mr. Ritter.

The estimated $75 million benefit is the total reported by the three centers in response to a request from NIST for economic impact data. The centers obtained the information entirely from estimates made by the principals of their client firms. The $75 million figure includes cost savings, increased sales of existing products, new business opportunities, and the ability to meet environmental regulations.

Because small companies are sensitive to releasing specific manufacturing or marketing information that could lessen their competitive advantage, the responses were not audited; NIST and the individual centers have reported the data as it was received.

The $9 million approximate cost of the program over the first 18 months is based on $1.5 million grants to each of the three centers for the first year, plus about $1.5 million for each center for the first half of the second year.

If the Subcommittee has other questions on our findings and recommendations for 1990, I will be happy to respond.

Sincerely,

Arden L Bement Jr

Arden L. Bement, Jr.
Chairman

cc:
Honorable Tom Lewis
Honorable Don Ritter

Executive Director: NIST Administration Building, Gaithersburg, MD 20899 (301-975-2158)

Mr. RITTER. Let me ask you another question. Doctor White, you talked about the Malcolm Baldrige Quality Award being so successful and having such an intense amount of activity, and it increased volume, and all of the above, that you would approach a kind to two-pronged strategy. You didn't really go into too much detail. You said one prong you would seek to expand the private sector funding base; and the other prong was sort of left somewhat up in the air. I take it you would expand the Federal budget support for the—

Dr. WHITE. Well, I think when the idea of funding as totally out of an industrial foundation was conceived, I don't think anyone at that time realized how successful the program was going to be. Furthermore, I think the focus was primarily on the manufacturing sector and not so much on the service sector. What has indeed happened is that now the service sector, which can include financial institutions, travel institutions —

Mr. RITTER. Why couldn't we still—I mean, if it is that great and there are people who want a piece of the action, why couldn't we still fund it as per the original?

Dr. WHITE. Well, when I say a two-pronged approach, first of all, I think the industrial endowment has to be increased and I think the base has to be broadened; the base of industrial support has to be broadened in order to keep that program as viable as it needs to be. I think that's first and foremost.

All we're really saying is the second prong is permission to use appropriated funds for the NIST part of the program so that we can provide adequate staff support and adequate staff leadership to continue to support that program.

Mr. RITTER. I would like at this point, and I know I speak for my colleagues, that the performance of NIST, with a few staffers to make this Baldrige Award as good as it has been, has been phenomenal and Curt Reimann and his team and NIST really deserve a tremendous amount of credit for a job well done.

And so you want to use further appropriated funds just to expand the capability to do what Curt and I guess three staffers up until now have been doing for the whole country.

Dr. WHITE. You know, you can say it is almost infinite leverage. It is not that good, but it is very high.

Mr. RITTER. Yes, yes, exactly. You mentioned in your — and I would agree with you that it is probably the best Federal investment in stimulating the U.S. economy that we ever made.

Last question. Doctor Bement, you kind of closed with some comments on—or comments by, not closed, some final thoughts—yes, you closed with the statement of the OSTP that recently recognized the legitimate role of the Federal Government in generic enabling technology development in the pre-competitive phase. To people like myself, that's a pretty major achievement in that we've been fighting a battle, almost an ideological battle, where, you know, it was either basic research or industrial policy and we hung, I think, on our own ideological petard there. Do you see this as a major step forward that the Administration at this point has accepted the idea that the Federal Government can help to do something in the not 40 year future, or 30 year future, or 20 year future?

Dr. BEMENT. I see it as a very dramatic historical change in this sense. When Vannevar Bush published his report, "Science: The Endless Frontier," he recognized the role of the Federal Government in three general areas as a piece of science policy: One was in national health, the second was in national defense, and the third was generally called national welfare. I think we're now beginning to understand what that third leg really represents—a national welfare in terms of a viable economy, in terms of jobs, in terms of high standard of living—but we haven't yet had a policy articulated around that. We've built up our defense investment in research and development; we've built up our Federal investment in national health; and we're just now beginning to focus on what it's going to require in order to make the necessary investment to look after our national welfare and economic viability. And I see the OSTP policy statement on generic technologies and the definition, which we haven't had until now, of what we mean by pre-competitive technology—which, incidentally, those definitions come directly out of the OMB rule for the Advanced Technology Program—

Mr. RITTER. Well, I, too, see this as a landmark step.

Dr. BEMENT. I see it as a landmark step.

Mr. RITTER. It is real progress, and I assume that NIST will play its rightful role in the implementation.

Thank you, Mr. Chairman. I yield back.

Mr. VALENTINE. Thank you, sir.

Ms. Horn?

Ms. HORN. Thank you, Mr. Chairman.

I have been very intrigued and pleased to hear you gentlemen offered the opportunities to say, yes, we want more money there; and a couple of times I've heard you shake your head and say, no, we don't. I would like to give you the opportunity to perhaps elaborate on an area you have indicated additional funds are needed, and that's the facilities question. Would you elaborate on that just briefly?

Dr. BEMENT. Yes, I would be delighted to. The Visiting Committee has looked at this with a great deal of interest, primarily because the facilities at Gaithersburg are now 25 years old, the facilities at Boulder are 35 years old, and, in spite of excellent stewardship, they fall down on three categories. One, is that there is just normal wear and tear, and some of the facilities really need refurbishment. But more critical than that, some of them are out of Federal compliance with law as far as fire safety, health safety, and also with regard to environment control.

More than that, with regard to environmental control of vibration, temperature, dust, clean room facilities, and so forth, the designs of those facilities that exist—you know, when they were built 25 to 35 years ago did not fully anticipate the kind of extreme environments that would be required for doing research almost at the atomic level. So to bring those facilities up to a world class capability in some cases will take considerable investment to improve that part of their capability.

Of course, this all comes as a result of not really appropriating funds to keep them fully modern in years past. So, in many cases, we're really catching up with benign neglect of past years.

So the Institute now has commissioned an architect engineering firm to do a comprehensive study of the need. And the Visiting Committee will be reviewing that program with the architect/engineer in our March meeting. We suspect that the cost is going to be quite high by the time we take all these factors into account. And the only way we can attack the problem is to take a systematic approach through a budget line appropriation and be sure that over time we bring those facilities up to world-class standards.

Ms. **Horn**. And that's the situation which they are looking at, is a phased-in sort of improvements as opposed to starting from scratch?

Dr. **Bement**. That's correct.

Ms. **Horn**. Thank you. I'm glad you had the opportunity to—

Dr. **Bement**. And I should say that we'll do this by a priority. We'll pay attention to the most critical needs first, those things that really affect health and safety and fire protection, and be sure that those elements are corrected first; and then we'll phase in the other parts of the program.

Ms. **Horn**. Thank you very much.

Mr. **Valentine**. Thank you.

Mrs. Morella?

Mrs. **Morella**. Thank you.

I mentioned to Congressman Gilchrest and Mr. Roemer that we are never provincial on this committee, by golly. The fact that NIST is in my district has nothing to do with that. I was very pleased though to hear our first two witnesses both be laudatory in their commendation of what NIST has done, and I think it shows a great deal for where we're going competitively and prepares for tomorrow's hearing, too.

I certainly want to thank you, Secretary White, for the kind words that you made about my bill, H.R. 191. I do think it is needed. And the Department of Commerce has consistently been a strong advocate of a Federal technology transfer. It was just this morning that we heard from Secretary Watkins regarding the President's National Energy Strategy, and that contained protections for intellectual property as a means of enhancing Federal technology transfer. I wondered if you might briefly discuss the role of Federal technology transfer in this Department?

Dr. **White**. We have the technology transfer function within the Technology Administration. We are working very closely with many of the Department of Energy laboratories, as I said, in trying to expose the technology that they have developed; and also working both with the researchers within the laboratories, making them aware of the new Technology Transfer Act, and also making industry aware of the technology and what opportunities they have to license that technology. And so we are playing in a sense the role of a broker in converting, getting the technology in the Federal laboratories out into the private sector. And, as I say, we do this through a variety of means. We also maintain a database on all the kinds of research that's going on within some of these laboratories and make that available to the private sector.

Mrs. **Morella**. And it has, indeed, been enhanced as of late and I think this budget should—

Dr. **White**. We are continually looking for opportunities to remove barriers, as your bill does, to foster the competitiveness aspect of these technologies.

Mrs. **Morella**. And in your testimony you mention a program that I think is very important, the Advanced Technology Program, the partnership between Government and industry. Because of the somewhat limited funding, what areas of industry do you think it should support?

Dr. **White**. I think the thing to me that's been very instructive is that this program is very unique in the sense that we are responding to proposals from industry, much as say the National Science Foundation responds to proposals from universities. And then, on the other hand, we use the private sector to a large extent, as well as many people from within the Federal Government, to evaluate those proposals. So they are in a sense industry proposed and industry evaluated.

In the ATP program, as you know, there are two phases; there is a technical evaluation and there is a business evaluation. The business evaluation involves venture capitalists, it involves people from the Industrial Research Institute, and so forth, who try to evaluate the economic potential of these programs. I think that as a result of that—there are over 600 people involved in the elevation of this in this first round. As a result of that, I think what we will find is that we will get a very good consensus spectrum of technologies. And I think that that, it seems to me, is the best way to try to decide how we're going to invest and to build up this portfolio of technology development programs.

Mrs. **Morella**. Do you see it growing or you would depend on the evaluation?

Dr. **White**. I think it is certainly that—I don't think there's probably a program within the Government that is being as tracked as carefully as this one. I mean, after this first round, we will be able to tell you all sorts of statistics about who applied from where, and all sorts of things. So I think we are looking—obviously, it is something that's under a microscope and we realize that, and I think we will look at it very carefully. So it is in an experimental stage in a sense.

Mrs. **Morella**. Doctor Bement, I want to give you an opportunity to comment on that since you were chairman of the Visiting Committee at NIST.

Dr. **Bement**. Yes, thank you. The Visiting Committee really wants to see this program succeed because I think the way it was conceived and the way it was structured and the way the rules were developed it has tremendous potential from a competitiveness point of view. But I think it also has to earn its way in terms of getting growth, funding increases, and so forth. For that reason, the Visiting Committee has spent a lot of time on this program and we're going to review the first round selections at our next meeting. We'll continue to track it and we'll probably report on it during the course of the year. So, we're part of this oversight that Secretary White talked about.

I think over time it could very well have a potential of becoming the size of a DARPA program, for example, and maybe not quite as large, but, certainly, up in the range of $200, $300, $500 million. I think if it is going to reach that level, we first have to be satisfied that it is going to be operated and based on merit, first of all, and that the returns on that investment are going to be very high. And we would like to see the same kind of leverage that we're beginning to measure in the manufacturing technology program.

Mrs. MORELLA. I am pleased to hear you also say it must earn its way, and it probably will.

Thank you. And I thank you, Mr. Chairman.

Mr. VALENTINE. Thank you very much.

And thank both of your gentlemen for your preparation and your time and patience.

We'll go now, with apologies, to the next panel.

Mr. LEWIS. Mr. Chairman.

Mr. VALENTINE. Yes?

Mr. LEWIS. Mr. Chairman, I have a unanimous consent request from Mr. Boehlert of New York. He would like to ask the agency witness a question. He has submitted a question, would like them submitted to the witness, and written responses recorded for the record.

Mr. VALENTINE. Without objection. Now, to both witnesses?

Mr. LEWIS. Just the agency witness, Doctor White.

Mr. VALENTINE. Okay. Thank you very much.

[The prepared questions submitted by Mr. Boehlert follow:]

QUESTION:

Your request for NIST is $248 million for the core research program and $46 million for grants.

-- If only one of these two components can be fully funded, would you suggest it be the core program or the grants?

-- Should the core program be fully funded before any funding goes to grants? If not, how much should the core program be provided before allocating resources for grants and what should the split be between the two as the available grant funding progresses from zero to $46 million?

ANSWER:

NIST's intramural research and services are extremely important to U.S. competitiveness in their own right. Because of zero real growth for the 15 years prior to FY 1991, NIST needs to address a rapidly growing number of important measurement and standards issues in support of U.S. industry and commerce. These same programs will also expand NIST's ability to perform generic applied research and technology development.

The newer extramural programs are also extremely valuable. They were placed at NIST because of the technological expertise and reputation for excellence that have been developed over many years here. These programs are not mutually exclusive and NIST must maintain a balance between its intramural and extramural programs. A healthy research base at NIST is crucial for providing the intellectual base for the technology transfer programs, keeping them informed and using the latest information and techniques. A broad program of research, coupled with NIST's extensive interactions with industry via its laboratory programs are necessary to underpin the extramural and technology transfer programs. Without the expertise developed through the intramural programs at NIST, the extramural programs could not achieve the desired results to help American industry improve its competitive position in the world marketplace. Therefore, to fund one of these programs to the exclusion of the other is not recommended.

QUESTION:

Current NIST core funding is $166 million. If only part of the requested $36 million increase for 1992 is provided, how much of the following increments of new money should be available for electrical engineering, manufacturing engineering, chemical technology, materials engineering, building and fire research, computer systems, and research support activities?

- a $15 million increase
- a $20 million increase
- a $25 million increase
- a $30 million increase

ANSWER:

A $15 million increase would allow NIST to fund its adjustments-to-base, facilities retrofit and a large portion of the computer security initiative. The adjustments-to-base are extremely important. Without them, the NIST base technical programs could not continue their operations at the same level as in previous years. The facilities retrofit initiative will address the safety and system capacity problems at both the NIST Gaithersburg, Maryland and Boulder, Colorado sites. The fire alarm systems must be replaced and additional sprinklers must be installed to bring our facilities up to the current fire codes. Additionally, we need to expand our service capacity, such as for chilled water and electrical systems, in order to keep up with the demands of our technical programs. The balance of these funds would enable NIST to make progress towards fulfilling requirements of the Computer Security Act of 1987 by providing the Government and industry with critically needed tools for protecting information resources in distributed computer and communications systems.

The next level of priority is the $8 million in programs approved by the Administration in fiscal year 1991 that could not be accommodated within the budget reconciliation level last year. These programs include Chemical Measurements and Standards, Lightwave Measurement Technology, Low Speed ISDN, Intelligent Processing of Materials, Intelligent Machines, Advanced Semiconductor Measurement Technology and Superconductivity.

The final priority is funding the remaining $13M in program increases requested for fiscal year 1992 for information technologies, manufacturing technology and standards, electronics and earthquake hazards reduction.

QUESTION:

If $20, $30, $40, $50, $60, $70, and $80 million more than $248 million were available in NIST funding, to what would you specifically suggest the additional resources be directed (e.g., which scientific and technical research and services programs and/or industrial technology services programs?)

ANSWER:

The FY92 budget meets all priorities identified by the Administration. No addtional funding is necessary or contemplated at this time.

UESTION:

The Advanced Technology Program gets no increase over the FY 91 Budget, the Hollings Manufacturing Technology Centers Program takes a small hit in the budget request, and the Boehlert-Rockefeller Technology Extension Program is zeroed out. With all the hoopla surrounding the Administration's support of research and technology, why don't these technology transfer programs fare better?

ANSWER:

The Advanced Technology Prgram (ATP) is in the experimental stage. A careful evaluation of program performance must be conducted before a significant expansion occurs. The President's FY92 Budget includes $25.9 million more than was included in his FY91 Budget. Awards totaling approximately $9 million have been announced. The balance of the available funds will be awarded before the end of the FY 1991.

Although a small program decrease in included in FY92 for the Manufacturing Technology Center (MTC) Program, a sixth center will be established. A formal third-year review of the initial three MTC's is being conducted to evaluate their effectiveness before additional funds are requested.

The State Technology Extension Program duplicates activities that are currently being funded by the states.

QUESTION:

The Hollings Centers and the Boehlert-Rockefeller Technology Extension Program were designed to be, as the Visiting Committee noted in their report complementary to one another. The two together allow the Federal government to make an effort to reach out and support small and medium-sized businesses move forward with new technologies. Could you explain the policy rationale for keeping the Hollings Centers and cutting the Boehlert-Rockefeller program?

ANSWER:

In many ways, these programs are complementary. The Administration has determined that the ATP and MTC programs could adequately support small and medium-sized businesses' new technology needs.

Mr. VALENTINE. The next panel consists of Mr. John C. Morley, president and chief executive officer, Reliance Electric Company, Cleveland; Ms. Jean Mayhew, manager, United Technologies Library and Information Services, East Hartford, Connecticut; Dr. Geraldine Cox, chairman, engineering Affairs Council, American Association of Engineering Societies, Washington; and Dr. Richard B. Marsten, vice chairman, IEEE- USA Engineering R&D Policy Committee, Washington.

We have, of course, as we always do, run over and I would urgently request each one of you please to condense your statements to no more than five minutes. What you have prepared will appear in the record in toto.

Thank you very much for your cooperation.

Mr. Morley?

STATEMENT OF JOHN C. MORLEY, PRESIDENT AND CHIEF EXECUTIVE OFFICER, RELIANCE ELECTRIC COMPANY, CLEVELAND, OHIO

Mr. MORLEY. Thank you, Mr. Chairman.

By way of identification, I am president and CEO of Reliance Electric Company which serves the industrial and telecommunications markets on a worldwide basis. But more relevant, I think, to this meeting, I serve also as chairman of the Cleveland Advanced Manufacturing Program, a network of area companies from a broad range of industry, academic institutions in the Cleveland area, and local and State and Federal Government. Our mission is to develop and transfer manufacturing technology.

I am here today, however, to testify as a member of the Board of Trustees of the Manufacturers' Alliance for Productivity and Innovation, known as MAPI. There are approximately 500 companies affiliated with MAPI.

U.S. manufacturing industries must compete successfully at home and abroad if we are to remain a leading industrial Nation, and we've heard testimony to that effect today. The manufacturing sector produces about 23 percent of the output of the U.S. economy; however, products manufactured in the U.S. account for 75 percent of all U.S. exports.

U.S. leadership in international markets has been eroding gradually over a number of years. The ability of U.S. industry to retain its leadership position in global markets will depend on the ability of all industries to innovate and increase their access to the latest technologies. The traditional U.S. advantage in cost-of-production has largely disappeared as other countries have invested heavily in new plant and equipment and in incorporating state of the art technology.

Now, while U.S. industry has responded by improving product quality and adapting world-class manufacturing methods to reverse this trend, we still have not matched the leaders in the productivity race. This requires capital investment in new equipment and systems that incorporate current technologies.

For the United States to continue to be a leading manufacturing country, Congress and the Administration must provide for a more favorable environment for assisting in the transfer of the technology. In 1989, as we've heard today, the Technology Administration, through the National Institute of Standards and Technology, engaged in its first program in technology extension services based, in part, on the experience of the agricultural extension services long provided by colleges of agriculture in many State universities.

The Great Lakes Manufacturing Technology Center in northeast Ohio is affiliated with CAMP and was designated as one of the first three Centers for this regional Manufacturing Technology Center Program. Let me speak, if I might, specifically about the Center to illustrate the value of the overall program.

The goal of the Center is to transfer existing manufacturing technologies to some 6,000 small- and medium- sized manufacturing companies employing over 400,000 people within a 60-mile radius of Cleveland, and to offer them assistance in adapting these technological concepts and techniques. The Center, with less than two years in existence, has contacted almost half of these companies. We have conducted 570 plant visits, and have undertaken over 100 programs to provide effective systems for incorporating increasingly sophisticated technologies into such operations.

The Center recently conducted a sample survey of 25 companies who had completed 26 technology transfer projects with the Center. One hundred percent of respondents said that the Center had been responsive to their needs. Sixty-three percent said the Center produced positive change in their companies. Sixty-five percent said their companies experienced increased employee productivity. Sixty percent said that the project enabled their companies to retain or obtain key customers. This is a remarkable result for any experimental program within the first two years of operations.

Mr. Chairman, this program is a demonstrated success with an impressive track record in encouraging and assisting many smaller manufacturing companies to adopt quality improvements that have made them more competitive as producers of their products and as suppliers to larger companies. It is estimated that the $4 million in Federal funds spent on the Great Lakes Manufacturing Technology Center have resulted in small companies making investments in technology with an economic impact over time between $60 and $80 million when we take into consideration factors of cost reduction, cost avoidance, inventory reduction, improved quality, reduced scrap, improved response time, and capacity improvements.

This program has the support of all major businesses in the Cleveland area, and I strongly urge that the relatively small Federal investment in the Manufacturing Technology Centers not be phased out. On the contrary, such support should be made permanent subject to periodic independent evaluation of the program performance, as we heard.

According to the County Business Patterns Report, compiled by the Department of Commerce, 98.5 percent of U.S. manufacturers have fewer than 500 employees, and these companies employ 62 percent of the manufacturing workforce and account for 55 percent of the manufacturing payroll. It is clear that we must direct more of the technological investment to these small- and mid-sized companies.

I thank you for this opportunity to present this perspective to the subcommittee.

[The prepared statement of Mr. Morley, plus additional material follow:]

Statement of

Manufacturers' Alliance for Productivity and Innovation (MAPI)

on

Improving U.S. Competitiveness Through Technology Transfer

Presented by

John C. Morley
President and Chief Executive Officer
Reliance Electric Company
and
Member, MAPI Board of Trustees

Before the

Subcommittee on Technology and Competitiveness
Committee on Science, Space and Technology
U.S. House of Representatives

February 26, 1991

Manufacturers' Alliance for Productivity and Innovation
1200 Eighteenth Street, N.W., Washington, D.C. 20036 (202) 331-8430

Statement of the
Manufacturers' Alliance for Productivity and Innovation (MAPI)
to the
Subcommittee on Technology and Competitiveness
House Committee on Science, Space and Technology
Concerning
Improving U.S. Competitiveness Through Technology Transfer

February 26, 1991

My name is John Morley, and I am President and Chief Executive Officer of Reliance Electric Company which serves industrial and telecommunications markets worldwide with sales of $1.5 billion. We manufacture and apply electric motors and generators as well as the drive systems required to control their performance. We manufacture a wide variety of mechanical power transmission products such as bearings, gear reducers, sheaves, and conveyor pulleys. Finally, our telecommunications products and systems serve the subscriber loop in the telecommunications market.

I am testifying today as a member of the Board of Trustees of the Manufacturers' Alliance for Productivity and Innovation (MAPI). MAPI is a nonprofit policy research organization which, for over 55 years, has conducted studies and seminars designed to encourage technological progress throughout the U.S. economy. The 500 companies affiliated with MAPI are heavily represented in the following industrial sectors: aerospace; automotive; electronics, computers, and telecommunications equipment; chemicals; oil and oil-related equipment; farm and construction machinery; and primary and fabricated metals. I am accompanied by Kenneth McLennan, President of MAPI, who may assist me in answering questions.

I am pleased to present MAPI's views on the 1992 authorization for the Technology Administration of the U.S. Department of Commerce and comment on how some of its programs can contribute to restoring the competitiveness of manufacturing in the United States.

I will first point up the importance of manufacturing to U.S. competitiveness in the global economy. Second, I will address some policy and program areas which should be addressed if U.S. industry is to maintain or regain its leadership in world markets.

Finally, we will suggest that the Department of Commerce take a second thorough look at metric activity in industry. Such an examination has not been done in over 20 years, and it is time to find out exactly what companies are doing in metric.

Erosion of the Leadership of U.S. Companies in "High-Tech" Global Markets

To remain a leading industrial nation, U.S. manufacturing industries must compete successfully at home and abroad. Indeed, with the growth of world trade and the increasing worldwide flow of investment, the distinction between domestic and foreign markets now has less significance for most industries. For a rapidly growing number of U.S. manufacturers, competition is now in global markets.

The competitive strength of the U.S. economy can now be said to be based upon the ability of products manufactured in the United States to compete internationally. While the manufacturing sector produces about 23 percent of the output of the U.S. economy, manufactured products account for 75 percent of all U.S. exports.

The erosion of U.S. leadership in international markets has been a gradual process. In the 1970s, imports from the Japanese and others increased their penetration of our domestic markets for manufactures, and U.S. exporters encountered strong competition in third-world markets, even at times when the U.S. dollar was declining in value. By the end of the decade, the U.S. position of leadership was lost in many product lines in such industries as automobiles, steel, machine tools, and electrical and nonelectrical machinery. The situation deteriorated further during the first half of the 1980s as the dollar appreciated very substantially.

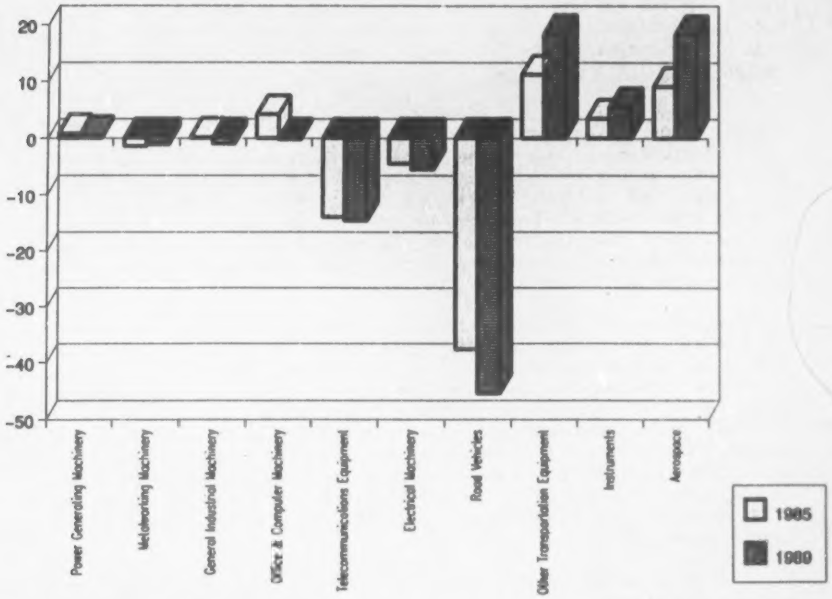
Since 1985 the value of the U.S. dollar has been declining, and in 1987 it had returned to its 1979 level vis-a-vis the Japanese yen and the currencies of most major industrial countries. This currency realignment stimulated U.S. exports, but the long period of U.S. economic expansion in the 1980s increased imports even faster. Consequently, the deficit in the balance of trade in U.S. manufactures, which was $89.5 billion in 1985, rose slightly to $92.5 billion in 1989. While the merchandise trade deficit has narrowed since 1989, much of this change is due to the decline in imports as a result of the current recession in the United States. The basic weakness in the U.S. trade position, especially in "high-tech" products, has not changed significantly since 1989.

As shown in Chart 1 on page 3, the trade deficit for road vehicles was, and continues to be, the major culprit and now accounts for almost one-half of the huge U.S. trade deficit in manufactures. U.S. manufacturing continues to have a strong trade surplus in aerospace, technical instruments, and transportation equipment, other than autos.

Chart 1 also shows, however, that there is a growing deficit in trade in the products of three relatively "high-tech" industrial sectors. These include electrical machinery and telecommunications equipment. There also has been a deterioration in the U.S. trade performance in office and computer machinery. The erosion in our dominance in computers and semiconductors is an example of things to come if we fail to make a strong commitment to technological development. It is apparent that the Japanese government's targeting of the semiconductor industry is paying dividends at the expense of U.S. manufacturers. Clearly, the ability of U.S. industry to retain its leadership position in global markets will depend importantly on the ability of all industries to innovate and increase their access to the latest technologies.

Chart 1

Trade Balance of Selected Manufactures, 1985 and 1989
(billions of dollars)



Source: Bureau of the Census, unpublished data.

Key to Competitiveness: Applying State-of-the-Art Technology to Production

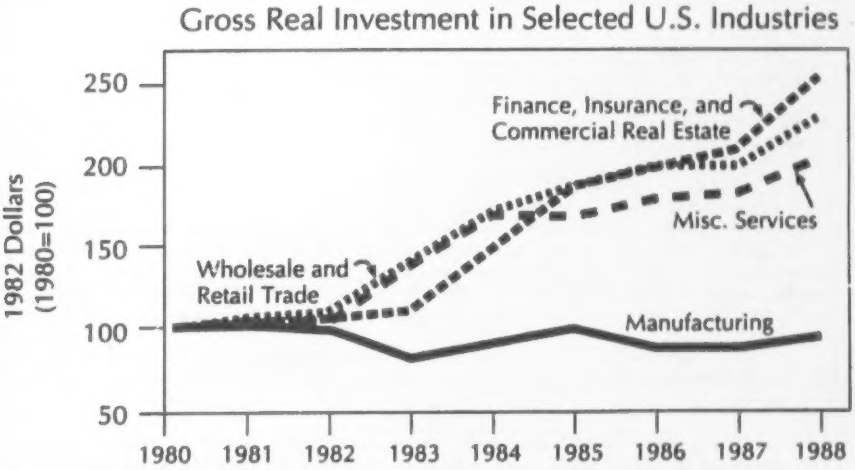
During the 1960s and early 1970s, U.S. manufacturing industries had higher levels of productivity than all foreign competitors. This was a significant competitive advantage since it gave U.S. producers the lowest unit costs of production.

At the same time, however, manufacturing productivity in other countries was rising faster than it was in the United States. After 30 years of lower productivity growth rates than those of their foreign competitors, U.S. companies in many industries are no longer the leaders in productivity. The traditional U.S. advantage in costs of production has largely disappeared as other countries have invested heavily in new plant and equipment, incorporating state-of-the-art technology.

During the 1980s, U.S. industry responded to the competitive challenge by improving product quality, initiating work force reductions at corporate offices and operational divisions, and by reallocating capital and labor resources to their most efficient uses. These private sector actions paid off in strong manufacturing productivity growth throughout the 1980s. But we were unable to match the leaders in the productivity race--Japan and the Newly Industrialized Countries (NICs).

The successful results of R&D must be transferred to production through process and product innovations if significant gains in productivity are to be realized. This can be accomplished only through capital investment--in the new equipment that incorporates the latest technologies. Over the past decade, the record of capital investment in U.S. manufacturing was relatively poor. As shown in Chart 2, when investment is measured by each establishment (by plant or facility rather than by company), during the 1980s the growth in gross real investment in manufacturing was flat and most of our capital investment was funneled to the nonmanufacturing sectors of the economy--sectors which will do little for U.S. competitiveness in world markets.

Chart 2



Source : William F. Kolarik, Jr., "Investment in U.S. Manufacturing: Less Than Meets the Eye," Technical Paper 90-1, U.S. Department of Commerce, Trade Information and Analysis, International Trade Administration.

Investment in research and development, improvements in the skills of the work force, and more effective managerial performance are all important to U.S. competitiveness. The major problem facing U.S. manufacturing is, however, that most other industrial countries invest a much higher proportion of their resources in new manufacturing plant and equipment. For example, in 1989 Japan, with an economy which produces about two-thirds the output of that of the U.S. economy, invested substantially more in absolute dollars in plant and equipment incorporating the most advanced technologies than did the United States. Obviously, this permits Japan to transfer new technologies throughout their industry much more rapidly than is possible in the United States. This advantage, more than any other, explains why Japan is such a strong competitor in world markets.

In order for the United States to continue to be a leading manufacturing country, Congress and the Administration must provide a much more favorable environment for stimulating capital investment. Many studies have pointed out the urgent need for greater investment in manufacturing plant and equipment./1 In the 1990s the critical issue for restoring U.S. competitiveness will be selecting those policies which will be most effective in lowering the cost of capital and in providing manufacturing with effective investment incentives.

Policies To Diffuse Existing Technologies

In 1989 the Technology Administration through the National Institute of Standards and Technology (NIST) engaged in its first program in technology extension services. The concept of extension service in manufacturing is based in part on the experience of agricultural extension services long provided by colleges of agriculture at many state universities.

Northeastern Ohio was one of three areas designated to receive one of the initial programs. The Cleveland Advanced Manufacturing Program, Great Lakes Manufacturing Technology Center (GLMTC), along with the Southeastern MTC in Columbia, South Carolina, and the Northeastern MTC in Troy, New York, were funded by the federal NIST program on a one-to-one matching basis. These centers receive additional funds from fees charged for the variety of services they provide to industry and from state and local government grants.

As Chairman of the Cleveland Advanced Manufacturing Program (CAMP), I can speak specifically about the GLMTC to illustrate the value of the overall program.

The goal of the GLMTC is to transfer existing manufacturing technologies to some 6,000 small- and medium-sized manufacturing companies in a 60-mile radius of Cleveland and to offer them assistance in adapting these

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1. For a review of the cost of capital and productivity performance in the United States and Japan, see Why U.S. Manufacturers Are at a Competitive Disadvantage, MAPI Policy Review 114, November 1990.

techniques. This geographical region covers one of the main centers of industry and manufacturing in middle America as it includes Akron, Canton, Youngstown, Lorain, Elyria, as well as Cleveland, and affects a significant number of companies and the associated manufacturing jobs. In the Cleveland area alone, there are over 6,000 manufacturing companies with over 400,000 employees. Most of these services for individual companies are provided by professionals drawn from a group of some 60 technical experts associated with CAMP. CAMP subsidizes the technical advisory services to small- and medium-sized companies within the target population.

I can assure you that the Great Lakes program has demonstrated that the joint partnership of the state, federal, and local governments to provide technical assistance has been highly successful. For example, the GLMTC has helped over 100 industrial companies in the northeast Ohio area. The center recently conducted a sample survey of 25 companies that had completed 26 technology diffusion projects with GLMTC. The results of the survey indicate that:

-- GLMTC projects resulted in the adaptation of critical new technologies for client companies, increasing their competitiveness and providing an environment for retaining and increasing employment.

    -- Sixty-five percent of respondents said their companies experienced increased employee productivity.

    -- Sixty percent of respondents said the project enabled their companies to retain key customers.

    -- Fifty percent said their companies experienced better employee relationships.

    -- Twenty-five percent said their companies experienced growth in market share; 20 percent said their companies experienced growth in sales; and 15 percent said their companies increased staff.

-- This is a remarkable record for any experimental program within its first two years of operation.

-- GLMTC was seen as a positive force in bringing new technologies to those who need it most--its client companies.

    -- One hundred percent of respondents said GLMTC was responsive to their company's needs.

    -- Sixty-three percent of respondents said GLMTC produced positive change in their companies.

-- Forty-two percent of respondents said that their contact with GLMTC was important or very important in triggering specific changes undertaken by their companies in the last 12 to 18 months.

Federal support for the manufacturing technology program is scheduled to be phased out gradually and end completely in 1994. Mr. Chairman, this program is a demonstrated success. It has enabled many smaller manufacturing companies to adopt existing technologies and improvements in their manufacturing processes. These are improvements that have made them competitive as producers of their products and suppliers to larger companies.

The total cost of federal investment in this six-year program to date is extremely small--$12 million--and has produced very high returns for the companies receiving technical assistance and for many workers in northeastern Ohio. The $4 million in federal funds spent on CAMP in 1990 have resulted in small companies making investments in technology with an estimated economic impact between $60-$80 million.

CAMP and the GLMTC have the support of all major businesses in the Cleveland area. In part this is because companies like Reliance Electric also receive indirect benefits, since the competitive strength of all major U.S. manufacturers depends on a strong network of highly efficient suppliers. We strongly urge that since GLMTC is a successful program, this small federal investment should not be phased out. On the contrary, such support should be made permanent, subject, of course, to periodic independent evaluation of the program's performance. Increasing productivity among all manufacturing companies is in every way a long-term process and deserves long-term public support. It would be a serious mistake to risk weakening a successful program by withdrawing support after only a few years.

The original charter of the Technology Administration through NIST was to establish two centers a year for six years for a total of twelve centers. Three years into the program, the establishment of the fourth and fifth center is just beginning. It is obvious that we are well behind what was intended in this program and need to get this critical mass in motion to realize the high payoffs from programs like CAMP/GLMTC. Accordingly, we urge that the Technology Administration be given the necessary appropriations to keep this program moving and that you restate the authorization to establish the MTCs as originally intended.

The U.S. suppliers to major manufacturing companies are often at a competitive disadvantage with foreign supplier companies, especially those from Japan. According to a February 1990 report, "Making Things Better," from the Office of Technology Assessment, the Japanese government provides about 20 times more financial aid to small business than does the U.S. government. There also is a close relationship between major Japanese manufacturers and their network of suppliers. In some instances Japanese manufacturers have an ownership position in their suppliers. In addition, experience has shown that U.S. suppliers have a great deal of difficulty in marketing to the U.S. affiliates of Japanese manufacturing companies since most Japanese exports to the United States are conducted through Japanese affiliates in this country.

The U.S. Department of Commerce, through the Technology Administration, has an important role to play in enabling joint government-industry partnerships to assist manufacturers in competing successfully with the integrated network of prime manufacturers and suppliers typical of the type of foreign competition coming from several major industrial countries.

Policies To Transfer New Technologies

Mr. Chairman, I also wish to comment on how to improve the transfer of new technologies developed in the public sector to businesses in the private sector. According to the National Science Foundation, the federal government spent $69 billion on research and development last year. The federal investment in R&D represents 46 percent of the $150 billion spent on research and development from all sources. How can we transfer the new technologies emerging from federal R&D and increase the return on this huge investment of public funds? The answer, of course, is to target more federal investment into dual-use technology--like the SEMATECH consortia--and to promote technology transfer from the federal laboratories to the private sector where it can be commercialized.

While responsibility for most federal R&D programs lies with other agencies, such as the Department of Defense, Department of Energy, etc., we hope that the Subcommittee will direct the Technology Administration of the Department of Commerce to assist U.S. industry by playing an active role in breaking down the barriers to cooperation between the federal research bureaucracy and private sector business. It also is important that U.S. businesses increase their awareness of the wealth of technical information and talent at our nation's federal laboratories.

Congress demonstrated its commitment to technology transfer as early as 1958 when in our quest for a moon landing the National Aeronautics and Space Administration (NASA) was charged with promoting technology transfer. More recent legislation, such as the Federal Technology Transfer Act of 1986 and the National Competitiveness Technology Transfer Act of 1989, require most federal labs to staff an in-house technology transfer function, allow them to license technology, and to enter into cooperative research and development agreements (CRADAs). According to a GAO report last year titled Implementation of the Technology Transfer Act: A Preliminary Assessment, the federal laboratories' record on technology transfer is spotty and "needs improvement." MAPI offers the following recommendations to improve the implementation of technology transfer from the federal government to the private sector.

There should be a centralized database on available technology developed at federal laboratories. Currently, the information that is available is dated and scattered around various agencies, NIST, and the Federal Laboratory Consortium. Being able to get through the maze of federal laboratories to find the technologies important to individual companies is essential for success. No agency has complete information nor could any handle a high volume of requests. More importantly, the congressional mandate for technology transfer should be reflected in each laboratory director's job performance evaluation. Congress also should require that technology transfer activities, such as the number of CRADAs, patents licensed, etc., be disclosed by each laboratory and its parent agency on a timely basis. That way Congress can monitor their progress.

Several issues associated with federally conducted R&D may need congressional attention. One is the computer software that is developed by federal employees. If federal agencies were able to copyright computer software developed by federal employees, it would greatly increase its commercial value. It is too risky for a company to invest in commercializing noncopyrighted software. Another problem area is in foreign patents. Federal laboratories do not file for foreign patents on technologies they develop. However, once they publish their findings in the technical literature, in many cases this action prevents them from patenting abroad. A screening process would identify important technology and protect its worldwide value for U.S. business. We recommend that the Subcommittee examine these issues as part of its future agenda to improve the competitiveness of U.S. industry.

Mr. Chairman, I wish to reiterate that for the United States to remain a leading industrial nation, we must not only invest in R&D but we must ensure that the results of R&D are adopted by industry. The Technology Administration of the U.S. Department of Commerce can do much to stimulate greater transfer of technologies throughout U.S. industry.

Manufacturing to Metric Standards Is Necessary To Compete in Export Markets

To compete successfully in the 1990s and beyond, a strategy based on beneficial uniformity and standardization, as well as the capability to tailor products, parts, distribution centers, services, engineering designs, and operations to meet local needs, is essential for success. That is where metric fits in. Or as one manufacturing executive put it: "Metrication is not the core issue; standardization of product offerings is the core. The point is to minimize variant components in satisfying unique national markets. Metric is like a grain of sand; it is the irritant which creates the pearl of unity."

Because of the growing importance of export markets, MAPI has kept its members informed of the importance of manufacturing to metric standards. MAPI's recent comprehensive report on this topic entitled Metric, Standardization, and Global Markets: The Implications for U.S. Industry has been one of its all-time best sellers. That suggests that there is a great deal of interest about the status of metric in the United States.

The Omnibus Trade and Competitiveness Act of 1988 declared for the first time in this nation's history that metric is the preferred system of measurement for U.S. trade and commerce and charged the federal government to set its own house in metric order. The government is now beginning to respond to its responsibilities under the Trade Act. Within the last year, the

General Services Administration has come out with an excellent metrication plan, the Department of Energy has published its own plan, and the Interagency Council on Metric Policy now meets regularly, chaired by Dr. White, the Under Secretary of Commerce for Technology. Dr. White's office has, in the last month and a half, published the new Federal Metric Policy which will guide federal agencies in their metric usage initiatives. In addition, the Federal Acquisition Regulation has been amended to advise the federal agencies of their responsibility in establishing guidelines for metric usage in formulating their requirements for acquisitions. Recently, in preparing a MAPI report on the economy in which we drew on material from the U.S. Industrial Outlook, published by the Commerce Department's International Trade Administration, we were pleased to note that metric was used throughout the publication.

In mentioning the General Services Administration's excellent metrication plan, I also want to commend the GSA for its heightened recognition of the trend away from unique federal and military standards and specifications and toward the adoption of commercial standards and the elimination of government design requirements. I just want to quote with approval a recent statement by the Associate Administrator for Acquisition Policy. He said:

> The increased acceptance of non-Government standards, commercial item descriptions, and multiple award schedule procurement methodologies reflects our willingness to accept metric products where they have entered into the marketplace. Conversely, the reliance in customary measurement units embedded in product specifications and standards is reduced.
>
> The key point here is that Federal agencies ability to influence metric conversion by industry can, in many cases, only mirror what those in industry are willing to accomplish themselves. To do otherwise would contradict our existing "buy commercial" policies. At the same time the opportunity for industry to adopt metric usage without fear of the loss of federal markets is greater than ever.

Mr. Chairman, MAPI wishes to make several recommendations for additional actions: First, we have to do more about teaching metric in the schools. The costs to industry of training employees in designing and working in the metric system are high and figure prominently in a company's "front-end" costs when working up a contract with a federal department or agency or with a foreign firm. Our competitors in the global market are metric trained and educated and we must be also. You may recall that during the bilateral negotiations between the United States and Japan on removing "structural impediments" to trade, the Japanese claimed that the nonmetric character of U.S. goods was a significant impediment to sales in their market.

Second, it is time we took a second thorough look at the status of metric in industry. Such an examination has not been done for over 20 years, not since the late 1960s and early 1970s when, at the behest of the Congress, the Department of Commerce (the Bureau of the Census) conducted a sweeping investigation of the metric question that resulted in the Commerce

Department's publication, A Metric America: A Decision Whose Time Has Come. That report certainly was a catalyst that led to the eventual passage of landmark legislation, the Metric Conversion Act of 1975.

We do not need the kind of sweeping investigation that the Department of Commerce conducted in the 1970s. We do need, however, some information on the extent to which industry has converted to metric and what difficulties companies face in making the transition. For these reasons, I recommend that this Subcommittee consider the possibility of having the Commerce Department (the Technology Administration) conduct a manufacturing survey of a representative sample of 300 companies. Such a questionnaire might consist of two parts: a general questionnaire which seeks to develop information on trends in metric usage, difficulties of increased metric usage for firms that have not used the metric system to any extent, and experiences of those firms that have made extensive use of the system; and a cost questionnaire which would ask for estimates of in-house added costs of a transition to metric usage at an optimum rate and how those costs might be affected by accelerated or delayed transition.

Mr. Chairman, thank you for the opportunity to present MAPI's views to the Subcommittee. I will be pleased to respond to any questions.

Biography

John C. Morley
President and Chief Executive Officer
Reliance Electric Company
Cleveland, Ohio

John C. Morley is President and Chief Executive Officer of Reliance Electric Company. He is a graduate of Yale University and of the University of Michigan where he earned a Master of Business Administration degree.

In December 1986, after nearly twenty-nine years with Exxon, Mr. Morley led an investor group in the leveraged acquisition of Reliance Electric Company from Exxon Corporation.

Mr. Morley joined Reliance in December 1980. Prior to Reliance, he held numerous executive positions with Exxon Corporation, including president of Exxon Chemical Company, USA, and senior vice president of Exxon, USA.

Mr. Morley serves as a director of Reliance Electric Company and is on the Boards of Ameritrust Corporation, Ferro Corporation, and AMP Incorporated. He is a board member of the Manufacturers' Alliance for Productivity and Innovation, Case Western Reserve University, University Hospitals of Cleveland, and Western Reserve Historical Society. He serves as Chairman of Greater Cleveland Health Quality Choice Program, and is a member of the Cleveland Commission on Poverty.

Mr. Morley is currently Chairman of the Cleveland Advanced Manufacturing Program, a joint initiative of state and local government, private industry and Cleveland universities to apply advanced manufacturing technology to the region's industry and promote economic development. He is also a member of the Visiting Committee of the Graduate School of Business Administration, University of Michigan.

November 13, 1990

1990 ANNUAL REPORT

TO THE NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY

BY THE

CLEVELAND ADVANCED MANUFACTURING PROGRAM

NIST - GREAT LAKES MANUFACTURING TECHNOLOGY CENTER

January - December 1990

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NIST
GREAT LAKES MANUFACTURING TECHNOLOGY CENTER

Statement of Purpose

To encourage and support small and mid-sized manufacturing companies operating in the Great Lakes region, and especially in northeastern Ohio, in the initiation and completion of projects to improve their competitiveness.

HIGHLIGHTS OF 1990 GLMTC ACTIVITIES

Numbers Served

* Initiated individual contact with 1,601 small and mid-sized manufacturing companies to introduce them to Great Lakes Manufacturing Technology Center's (GLMTC's) services. GLMTC has now contacted a total of 2,855 new companies since its inception. This represents about 50 percent of all manufacturing companies in the initial seven-county area served by the program.

* Made 312 plant visits to observe clients' operations. During these visits, GLMTC staff were often able to make suggestions for inexpensive changes that resulted in greatly increased productivity or other benefits to the company.

* Brought information about the Great Lakes Manufacturing Technology Center and other Cleveland Advanced Manufacturing Program (CAMP) centers to more than 26,300 participants in trade shows, public forums, and professional organizational meetings.

Technology Transfers

* Started 50 technology transfer projects, of which 43 have been completed. These projects have a total contractual value of $182,031. The potential economic impact on Ohio companies from the implementation of these projects is estimated to be $80.8 million.

* Surveyed 25 companies with completed GLMTC projects, and found that, as a result of the project:

- Seventy-five percent of respondents said their company is saving money.

- Sixty-five percent of respondents said their companies experienced increased employee productivity.

- Sixty percent of respondents said their companies were able to retain key customers.

- Fifty percent said their companies experienced better employee relationships.

- Twenty-five percent said their companies experienced growth in market share; 20 percent said their companies experienced growth in sales; and 15 percent said their companies increased staff.

HIGHLIGHTS OF 1990 GLMTC ACTIVITIES

Page 2

- Forty-two percent of respondents said that their contact with GLMTC was important or very important in triggering specific changes (in addition to the GLMTC project) undertaken by their companies in the last 12 to 18 months.

* Provided information on a variety of manufacturing technology and management topics to 1,976 individuals from private companies, colleges and universities, and other organizations at 11 monthly Luncheon Forums.

* Surveyed the May and December Luncheon Forum attendees and found:

- About 32 percent of manufacturing company attendees surveyed at the May Forum, and 45 percent at the December Forum, said their companies were making changes in business operations because of information learned at the Luncheon Forums.

- Five respondents estimated that changes to their business operations as a result of information learned at the Luncheon Forums will have a minimum economic impact on their companies of about $1.62 million.

* Provided 284 Instances of Technical Assistance (ITAs), short-term, pro bono interventions that provide technical information or referrals to other resources for clients. ITAs often provide direct solutions to a specific company problem.

* Provided in-depth technology-transfer training to 486 participants from 201 companies in seven technology transfer workshops and seminars.

* Provided 16 Services to Improve Your Technical Edge (SITE) one-day and multi-day assessments for clients.

* Co-sponsored, with the Unified Technologies Center, a three-day national conference in March on Total Quality Management. This conference was attended by 447 people from four countries, 24 states, and Puerto Rico. It featured speakers from companies that received the 1988 and 1989 Malcolm Baldrige National Quality Awards.

HIGHLIGHTS OF 1990 GLMTC ACTIVITIES

Page 3

Regional Activities

* Initiated the Association of Great Lakes Manufacturing Support Centers, a group of 30 technology support centers in Illinois, Indiana, Michigan, Minnesota, Ohio, Pennsylvania, and Wisconsin. After two general meetings in 1990, this association is now exploring the possibility of jointly sponsored workshops on support tools for technology transfer centers.

* Hosted visitors from more than 15 states, a variety of federal government agencies, and several foreign countries, all interested in technology transfer or support for small manufacturers.

* Participated as speakers, workshop providers, and attendees in state, regional, and national technology conferences, as well as helped develop programs and find speakers for many technical professional organization meetings.

Internal Activities

* Developed a SITE Assessment Procedures Manual.

* Prepared the database of GLMTC client interactions for transfer from a Paradox, PC-based system to an INGRES, Unix-based network system.

* Completed purchasing all equipment for the Manufacturing Resource Facility.

* Instituted program evaluation research to determine the effectiveness and impact of SITE Assessments, projects, and Luncheon Forums.

* Created an Advisory Committee made up of representatives of GLMTC client companies, other CAMP centers and the Cleveland business community.

* Developed a Client Account Planning Procedure Manual.

* Developed operating procedures for initiating, tracking, and recording project proposals, from initial visit to the company to final completion of a project.

INTRODUCTION

The Great Lakes Manufacturing Technology Center is a division of the Cleveland Advanced Manufacturing Program, a membership organization that brings manufacturers together with Cleveland-area college and university research and training centers.

The GLMTC program is divided into two areas -- industry programs and technical programs. In addition, a regional coordinator addresses technology transfer issues within the Great Lakes region. Support to the technical staff is provided by an information specialist who maintains a library of multi-media technology information and databases and does technical literature searches.

Throughout this report, individual company names have been omitted to protect client confidentiality. Companies are referenced by their GLMTC database number. (i.e. Company C01234)

INDUSTRY PROGRAMS

Purpose of Industry Programs

The manager of Industry Programs and his staff of technology application engineers (TAEs) are the first contacts between the GLMTC and small to mid-sized manufacturing companies in the Great Lakes region. Their role is to:

* Initiate contact with manufacturers;

* Answer manufacturers' questions about new management techniques and new manufacturing technology;

* Encourage manufacturers to attend Luncheon Forums, workshops, and seminars about new technology;

* Provide one-day or multi-day technology assessments of manufacturing companies;

* Search out expertise from government, education, and private sources and act as a liaison to those resources to address specific client company needs.

* Refer manufacturers to resources for technology training and organizational development assistance that will make their companies more competitive.

New Client Contacts

In 1990, Industry Program staff contacted 1,601 new companies to introduce them to GLMTC, and to encourage them to attend Luncheon Forums/workshops or to use other GLMTC services. Of these, 462 were contacted in the fourth quarter of 1990.

Plant Visits

Industry Program staff also made 312 first-time plant visits this year, 55 of which were in the fourth quarter.

Technical Assistance

Technical assistance interventions which GLMTC staff provide on a pro bono basis are called Instances of Technical Assistance (ITAs). This year, 284 ITAs were performed by GLMTC staff, 96 in the last quarter. ITAs generally fall into four categories:

* Linking client companies with potential suppliers, customers, consultants, or other resources;

* Providing evaluation of, or information about, computer hardware and software systems, especially PC-based systems;

* Providing short-term technical engineering assistance, such as suggesting modest changes to plant layouts, finding the cause of a manufacturing problem, analyzing process procedures, etc.;

* Researching technical information, such as doing computerized searches of national technical databases or calling research centers, to find specific resources for a client.

While these projects involve a modest investment of time by GLMTC staff, (ranging from 2 to 40 hours, but averaging about eight) the impact is often significant. An analysis of five selected ITAs in the third quarter revealed a total economic impact of over $1 million. A complete list of 1990 ITAs is included in Appendix A. (This list was generated by the new INGRES database.)

Building Client Relationships

To strengthen and unify the way TAEs initiate company contacts and encourage use of GLMTC resources by its clients, a uniform client account planning procedure is being drafted. This will include a checklist and other resources to help TAEs identify important client needs. A copy of the first draft of this procedure is in Appendix B.

Luncheon Forums

Purpose

Every month except August, GLMTC sponsors a Luncheon Forum. (See Appendix C for complete 1990 attendance figures and flyers for fourth-quarter 1990 Luncheon Forums.) The Luncheon Forums serve two purposes: 1) to introduce managers of small to mid-sized manufacturing companies to new technology or management strategies that could help make their companies more competitive, and 2) to provide an opportunity for these managers to network with their peers. In 1990, there were 1,976 Luncheon Forum attendees, 706 in the last quarter.

Topics in the Fourth Quarter

"Supplier Relationships at Honda of America"
October 10, 1990

Outsourcing of manufacturing parts is a major effort at Honda's Ohio facility. This forum focused on Honda's approach to working with suppliers. There were 287 attendees from 112 companies.

"World Class Success Through Synchronous Manufacturing"
November 7, 1990

Synchronous manufacturing, using CIM, JIT, and MRP II, enables companies to formulate a manufacturing strategy to increase shipments, reduce inventory and expenses, and, thus, maximize profits. This luncheon focused on an innovative program aimed at addressing the "weak links" in the manufacturing chain. There were 238 people in attendance from 86 companies.

"Quality Success Story at American Steel and Wire"
December 5, 1990

American Steel and Wire was founded in 1986 when it purchased and reopened a closed U.S. Steel plant. Through its dedication to a total quality program, the company has had remarkable growth and built a solid reputation for providing a level of product quality not previously available in North America. One hundred eighty-one people from 64 companies attended this forum.

Results

Two surveys of Luncheon Forum participants were conducted in 1990 to determine how successful the forums were in encouraging participants to take advantage of new technologies and manufacturing management techniques. These surveys were conducted at the May and December 1990 Luncheon Forums. Results showed:

1. The May and December Luncheon Forums had about 69 and 71 percent of attendees, respectively, from manufacturing companies.

2. In May, about 32 percent of all manufacturing attendees said that their companies were making, or were planning to make, changes because of information learned at a Luncheon

Forum. While few attendees gave figures for costs and savings from these changes, five companies estimated savings totaling $1.72 million from implementing these changes.

3. In December, about 45 percent of manufacturing participants said that their companies were making changes or planning to make them as a result of information learned at the Luncheon Forums. Estimated savings as a result of implementing these changes, from five attendees who answered this question, was $1.62 million.

4. Both the May and December surveys showed that almost two-thirds of attendees made business contacts at the forums. In December, manufacturing attendees used these business contacts to talk to people about technical changes in their company (53.8%), find advisors (48.7%), and locate suppliers (38.5%).

See Appendix D for a copy of the December survey report.

SITE Assessments

Description

Services to Improve Your Technical Edge (SITE) Assessments help small and mid-sized manufacturers evaluate their manufacturing processes and their use of technology. Industry Program staff provide a one-day or a multi-day assessment using a modification of the Small Manufacturers' Improvement Services (SMIS), a methodology developed by the United States Air Force. Assessments use a structured questionnaire and staff observations to help determine strengths and weaknesses in a client's manufacturing operation. A written report of the assessment is provided to the manufacturer and includes:

* A summary of the manufacturing processes examined and the company's present use of production technology;

* Recommendations for management techniques or new technology that could assist the company;

* Topics that need further analysis;

* Referral to other resources to assist the company, either within GLMTC and CAMP, or other resources in the region.

One-day assessments are free to CAMP members and cost $500 for non-CAMP members. Multi-day assessments are $500/day, with the first day free for CAMP members.

Number of Assessments

In 1990, 16 SITE Assessments were completed. Of these, four were done in the last quarter. A sample SITE Assessment report from this quarter appears in Appendix E.

Results

Most assessments are expected to result in either smaller projects (carried out by the company itself or by GLMTC technical staff), or proposals to the customer for sizable technical assistance projects. Fourth quarter activities with companies having earlier SITE assessments include:

Company C06504 - a precision manufacturer of diesel fuel injectors, injector components, and other diesel engine parts. Received SITE Assessment in February, 1990. Follow-up activity by GLMTC includes:

11/23 - ITA - provide sources of information on MRP education.
12/21 - ITA - provide information on thread holding strength.
12/21 - ITA - provide information and copies of articles on EC92 and ISO 9000.

Company C08880 - a manufacturer of electrical transformers. Received assessment in June, 1990.

11/30 - ITA - provide literature search on articles about configuration management, a management structure developed by the Department of Defense.

Company C08553 - a diversified manufacturer of electrical insulation components, transformer products, and plastic drum components. Received assessment in July, 1990.

10/26 - Project - provide an in-plant quality audit.
11/02 - ITA - identify sources to assist in writing and printing an internal company newsletter.
11/30 - Project - develop quality assurance and procedures manuals.

Company C08692 - a die-cast company that services the electrical fitting industry. Received assessment in September, 1990.

10/05 - ITA - make recommendations on MIS selection and implementation planning.
10/26 - ITA - provide information on quick die change and economic lot sizing.

Company C09035 - a manufacturer of molded plastic products. Received assessment in August, 1990.

10/12 - ITA - help in writing technical job descriptions.

Company C06640 - a manufacturer of small stampings, washers, and non-precision bearings. Has two Cleveland plants. Received assessment in September, 1990.

10/05 - ITA - recommend sources for new employees.
12/21 - ITA - provide information on cost-of-quality training resources.
12/21 - ITA - find metallurgist to solve copper plating problem.

Internal Procedures

To make SITE Assessment services consistent, no matter which TAE provides them, a GLMTC SITE Assessment Procedures Manual has been developed. A copy of the manual is included in Appendix F.

Networking

One of the roles of Industry Program staff is to take information about GLMTC and other CAMP programs to other technical professional organizations to encourage greater participation in GLMTC by area manufacturers.

The following are some of the networking activities in which GLMTC Industry Program staff participated in the fourth quarter of 1990:

* Staffed a CAMP/GLMTC booth at the Ohio Manufacturers Association Conference in October. This conference was attended by more than 500 people.

* Staffed CAMP/GLMTC booth at the Great Lakes Industrial Show, which ran for three days in November and was attended by more than 25,000 people.

* Participated in the November three-day meeting of the National Coalition of Advanced Technology Centers (NCATC). GLMTC staff did a "Train the Trainer" workshop on organizing technology transfer events for small manufacturers, which was attended by 20 conference participants.

* Arranged a plant tour of a local company for the Society of Manufacturing Engineers (SME), so members could observe cell technology. Thirty engineers participated in this November event.

* Set up a guest speaker on the topic "Education and Manufacturing - the Year 2000" for a December chapter meeting of SME, attended by 30 members.

* Staffed a CAMP/GLMTC booth in October at a three-day regional Competitive Manufacturing Conference sponsored by the University of Dayton. About 400 management-level people attended this conference.

* Spoke about CAMP/GLMTC to The Executive Committee, a group of about 15 CEOs from small and mid-sized manufacturing companies in Cleveland.

* Gave small group presentations about CAMP/GLMTC and its services for small manufacturers to four individual companies. Some 95 management and technical staff were involved in these four meetings.

* Set up a focus group meeting in November for area stamping companies to identify special needs and generate ideas about how GLMTC could serve stamping companies better. Meeting was attended by 38 people. See Appendix G for the agenda and outcomes of this meeting.

* Initiated preliminary work to create an electronics manufacturers focus group.

* Arranged a Cleveland Engineering Society tour of the Ford Motor Company plant that was attended by about 100 members.

* Attended two Assessment Development Steering Committee meetings of the Northeast Manufacturing Technology Center (NEMTC) in December. The 15 attendees discussed technical assessment techniques and philosophy.

TECHNICAL PROGRAMS

GLMTC Technical Program Managers (TPMs) have primary responsibility for four areas:

* Design, development, and maintenance of the Manufacturing Resource Facility (MRF), a manufacturing technology demonstration and training center established in cooperation with the Unified Technologies Center, a CAMP affiliate;

* Project management for all GLMTC projects, including those for which services are provided by CAMP affiliates or non-CAMP resources;

* Delivery of technical services on certain projects for GLMTC clients;

- Design, development, and implementation of in-house technical resources for GLMTC staff, such as the client database and an in-house workstation network.

The Manufacturing Resource Facility

Description

The Manufacturing Resource Facility (MRF) is a hands-on demonstration facility where the latest manufacturing equipment supports seminars, workshops, and training activities in advanced manufacturing technologies. The 15,000-square-foot facility is divided into three centers and a Special Projects area. The three centers are CAD/CAM/CIM, Quality Improvement, and Equipment Upgrades. The Special Projects area features short-term displays and demonstrations of other types of manufacturing technology.

All equipment for the MRF is now on-site and is being installed. Delays in building renovation have postponed the completion of the facility until March, 1991. However, several pieces of equipment and software are available for demonstration. These include:

- An Intergraph CAD/CAM/CAE system;
- A Symix MRP system;
- A Cellworks cell control system;
- An Allen-Bradley vision system.

A formal public opening in May is projected. The date will be confirmed next quarter.

Projects

Description

GLMTC handles a wide range of projects of various sizes, which may last from two days to several months. In 1990, 95 project proposals were submitted. Of these, 50 were accepted and begun in 1990. Eight of these 50 were started in the fourth quarter and had a contractual value of $40,642.17. The projected economic impact of projects begun in 1990 is $80.8 million, with $6.6 million of that coming from projects begun in the fourth quarter. A summary of the total economic impact of 1990 and fourth-quarter projects, broken down by type of economic impact, appears in Appendix H.

Projects Begun in the Fourth Quarter

Company C05035

Help client with planning a new plant layout to prepare for a move from a 10,000- to a 45,000-square-foot facility. The project enabled the company to maintain its timetable for a three-fold expansion in space and employees and a $3 million increase in sales. The plan was completed in December, and the company is now moving into the new space. Project began 10/18/90. Completed.

Company C08607

Provide a database search of the technical literature on chemical compounds used for acoustic optical techniques. Project began 10/15/90. Completed.

Company C08553

1. Assist with in-plant quality audit. This was the first phase of a larger project. Project began 10/26/90. Completed.

2. Two phases: 1) prepare a quality assurance manual; and 2) prepare a quality procedures manual for two of the company's divisions. Project began 11/28/90. In process.

(These two projects are part of a Total Quality Management program which the company is undertaking with GLMTC.)

Company C06265

Help plan move and layout for a new factory that will combine two separate facilities and warehouses in a single new facility. Project began 11/1/90. In process.

Company C08958

Provide audit of existing business system hardware and software. Suggest improvements in both areas to accommodate anticipated sales growth of 50 percent next year. In the past two years, the company's revenues have doubled. Project began 11/14/90. In process.

Company C05880

Analyze product flow and plant floor layout to reduce inventory and process costs by at least $1 million. The company is presently operating at 100 percent capacity but is not making a profit. Project began 11/23/90. In process.

Company C06065

Help finish MRP user training cycle and optimize MRP system's benefits. This is an on-going project with monthly involvement by GLMTC staff in overall implementation and operation. Project began 12/21/90. In process.

Examples of Projects Completed in Last Quarter

Company C05091

CAMP's Advanced Manufacturing Center (AMC) evaluated the feasibility of applying an adhesive to the inside threads of a part. Research showed that the process was practical and could probably be automated. Project report was delivered 12/10/90. Potential economic impact to the company from this project is over $1 million.

Company C08880

Project involved 1) reviewing machining and assembly procedures in the pump and compressor shop and making recommendations for improvement, and 2) studying the company's measurement requirements and evaluating the feasibility of non-contact gauging. Final project report included 21 recommendations for improving the quality and efficiency of the company's machining operations. Final report was delivered 10/10/90. Potential economic impact is $100,000.

Company C01227

Project consisted of a study to gather information with which to propose a bar-coding system that would help the firm track its shop orders through the production process, collect associated labor and quantity data, and control inventory. A shop floor data collection systems was recommended. Final report was presented 12/12/90. Potential economic impact is $19,493.

Company C08505

Project was an assessment to determine what efforts would be required to attain World Class Manufacturing excellence at the company. It involved interviews with everyone in the organization, from the marketing staff to shop floor personnel. Recommendations included improvements to quality and product flow, and suggestions for better use of the existing manufacturing system. Project was completed 11/7/90. Potential economic impact is $2.1 million.

Company C08258

Project was a study of the company's current information systems and materials management procedures to develop recommendations on how these systems could accommodate a just-in-time manufacturing philosophy. Report was presented 12/7/90. Potential economic benefit to the company is $2.4 million.

Company C08805

Project was to help company develop and evaluate various CAD/CAE tools to improve design reliability and to reduce the overall engineering cycle in the development of speciality plastic molded parts. The objective was to obtain up to a 300 percent productivity improvement with the new tools. New equipment and software have been purchased. Potential economic impact from increased productivity is over $100,000. Additional impact as a result of improved engineering processes and reduced cycle time will easily double this economic impact.

Company C07437

Project was to evaluate current CAD capability and operations to expand overall CAD engineering capability. The study and evaluation included recommendations for several vendor products. Potential economic impact is over $100,000.

Sample reports from these projects are included in Appendix I.

Results

In October, GLMTC engaged an outside research firm to survey 25 companies that had completed 26 technology transfer projects with GLMTC. Results indicated:

* GLMTC projects resulted in many positive benefits for client companies.

  - Seventy-five percent of respondents said the project will save their company money.

  - Sixty-five percent of respondents said their companies experienced increased employee productivity.

  - Sixty percent of respondents said the project enabled their companies to retain key customers.

  - Fifty percent said their companies experienced better employee relationships.

  - Twenty-five percent said their companies experienced growth in market share; 20 percent said their companies experienced growth in sales; and 15 percent said their companies increased staff.

* GLMTC was seen as a positive force in client companies.

  - One hundred percent of respondents said GLMTC was responsive to their company's needs, and that they would call GLMTC the next time they need outside technical assistance.

  - Sixty-three percent of respondents said GLMTC caused change to occur in their companies.

  - Forty-two percent of respondents said that their contact with GLMTC was important or very important in triggering specific changes undertaken by their companies in the last 12 to 18 months.

A copy of the complete Project Follow-up Report is included in Appendix J.

Technology Transfer Events

GLMTC provided seven technology transfer seminars or workshops in 1990, which were attended by 486 people. In the fourth quarter, two seminars were offered:

"Business Systems for the Small Manufacturer"
November 29, 1990

Attended by 102 people from 45 companies, this seminar covered software solutions that can help small businesses reduce inventory and increase sales and productivity. The seminar focused on affordable, pre-programmed systems.

"Boosting PC Productivity in Manufacturing"
December 13, 1990

This seminar focused on the personal computer, its use, its potential for expanded applications and its future. The seminar was attended by 48 people from 16 companies.

GLMTC also co-sponsored, with the Unified Technologies Center, a three-day national conference, in March, on Total Quality Management. This conference was attended by 447 people from four countries, 24 states, and Puerto Rico. It featured speakers from companies that received the 1988 and 1989 Malcolm Baldrige National Quality Awards, as well as information on how to apply for the award and what criteria the judges used when choosing the winners.

Complete GLMTC seminar attendance figures and copies of seminar announcements for the fourth quarter are in Appendix K.

Networking

An important function of the Technical Programs staff is to participate in professional networking to stay current on resources and developments that could increase the effectiveness of GLMTC as a technology transfer agency. In the fourth quarter, two networking contacts helped GLMTC pursue this goal:

* A GLMTC TPM presented an SME blue book paper at AUTOFACT. More than 80 people attended his seminar. This same staff person is involved in developing case studies on data interchange between CAD systems from different vendors for the IGES/PDES Organization (IPO).

* Another TPM is chairman of the Awards Committee of National Engineers Week, a Cleveland area committee of approximately 30 people from various engineering and technical societies in northeast Ohio. This committee decides who receives the Engineer of the Year Award and other technical awards in the northeast Ohio area.

Database Development

GLMTC completed final testing of its new INGRESS database in the fourth quarter. As of January 1991, the database, used by staff for tracking all client interactions, will be on-line to the network and available for use by program staff.

The database now contains data on 5,949 manufacturing companies in the northeast Ohio area. Additional information on GLMTC's interactions with the more than 2,800 companies with which it has established a relationship has been fully integrated into this database.

REGIONAL COORDINATOR

The goal of the Regional Coordinator is to identify and encourage the development of and cooperation among technology transfer resources within the Great Lakes region. The Coordinator carries out a wide variety of activities in pursuit of this goal.

Association of Great Lakes Manufacturing Support Centers

The second organizational meeting of the Association of Great Lakes Manufacturing Support Centers (AGLMSC) was held in October. The purpose of AGLMSC is to build on each center's strengths and successes, and to share programs and strategic expertise so that technology resources are more rapidly available to more small and mid-sized manufacturers.

Results of a survey of AGLMSC members done by GLMTC staff were presented to the meeting. The top priority for the association was offering several pilot workshops on topics of special interest to members, such as using assessment instruments to help small manufacturers, developing mechanisms for measuring center success, etc. The planned workshop program has been submitted to the Great Lakes Governors Technology Council for its endorsement. GLMTC is beginning to develop these workshops, including presenting possible workshop outlines to AGLMSC members and surveying technology centers in the region to seek their support for conducting the workshops.

Regional Organizational Linkages

In 1990, the Regional Coordinator and GLMTC management and staff began to establish links with other technology transfer organizations, locally, regionally, and nationally. GLMTC has even hosted international visitors. In the fourth quarter, some of the most important organizational linkages included:

* Cooperative programming with other agencies, including:

  - Two Boehlert-Rockefeller grants were awarded to the State of Pennsylvania and the Michigan peninsula to establish relationships with GLMTC. Pennsylvania's Industrial Resource Center (IRC) directors will be working with GLMTC on a teleconference presentation about the IRCs. In addition, a proposal for joint activities by GLMTC and the northwest Pennsylvania IRC in Erie is in process.

  - The partnership program with Lorain County Community College (LCCC) that began earlier in the year with GLMTC training LCCC program developers, has resulted in over 30 first-time contacts with small manufacturers in the Lorain area.

  - A multi-organizational effort to develop a world-class plastics training center for the Akron area began. Participants are: GLMTC, the Edison Polymer Innovation Corporation (EPIC), the Akron Regional Development Board, and the Ohio Industrial Training Program (OITP).

  - A meeting was held in November between GLMTC and NASA staff to discuss ways that GLMTC could assist in transferring NASA technology to private industry. Several NASA technologies which have a high potential for transfer to private industry were discussed and follow-up with specific small manufacturers is in process.

  - The Minnesota Corporation's Minnesota Advanced Manufacturing Technology Center requested assistance in assessing proposed sites for additional technology centers. The Regional Coordinator participated in the assessment of six potential sites.

* Information-sharing with other organizations through presentations, discussions, or meetings, including:

- Minnesota-Winona Composite Center, to share information about GLMTC's operating procedures its Plastics Industry Focus Group.

- U.S. House Committee on Science and Technology, to give background information on CAMP and NIST and to discuss GLMTC's impact on technology development in the region.

- University of Tennessee Center for Industrial Services, to discuss their Waste Reduction Assistance Program and to find out how they handle other manufacturing-related environmental problems.

- State of New York and City of New York. Several representatives visited, and were given a presentation on CAMP and GLMTC.

- The French Consul's Technical Attache' to Washington received a GLMTC presentation and tour in October.

* Requests for technology information from the region, including a:

- Request for information by an Indiana company. Resulted in a GLMTC proposal to assist with a CAD/CAM system.

- Request for assistance from a steel processing company in Youngstown, through Youngstown State University and the Ohio Technology Transfer Organization (OTTO). A GLMTC TAE is now working to assist this client.

- Request by the Kinzie Industrial Development Corporation for information on technology transfer organizations in the Chicago area. Resulted in sharing information on GLMTC and referral to the Illinois Commission on Science and Technology.

- Request by a Virginia company on heat-treating assistance. Was referred to the Virginia Center for Private-Public Initiatives.

- Request from company in Elkhart Lake, Indiana, for assistance with automation. Was referred to a GLMTC TAE after no local Indiana resource was found. A GLMTC project has been proposed.

OTHER ACTIVITIES

Staff Changes

During 1990, GLMTC added nine professionals to its staff. These included the project manager and first technician for the MRF, two TPMs, three TAEs and a programmer analyst. In the fourth quarter, the following staff were added:

Matthew Hofener - Programmer Analyst, responsible for supporting the GLMTC internal network and database.

Tom Szabo - Technology Application Engineer, with a background in project engineering, automation, and manufacturing management.

Supriyo R. Sen - Technology Application Engineer, with a background in programmable controllers, electronics, and automation, and a broad range of marketing and management experience.

Copies of the resumes of the three new staff members are in Appendix L.

Advisory Board

A 12-person GLMTC Advisory Board was created in 1990 to provide input and feedback on the GLMTC program. Membership on the Advisory Board comes from other CAMP Centers and GLMTC client companies. The board meets quarterly. GLMTC market segmentation was discussed at the last meeting.

Product Development

No generic GLMTC products were developed. However, several GLMTC projects involved specific product improvements for client companies.

Patents and Licensing

None.

SUPPORT SERVICES

Marketing

Advertising

CAMP advertised GLMTC's outreach and technical assessment services in the Great Lakes Industrial Show issue of Midwest Purchasing Management. This magazine was mailed to subscribers and copies were distributed to the 25,000 attendees of the industrial show.

Direct Mail

The Conveyor, a bi-monthly newsletter with information about all CAMP programs, is sent to about 1,350 people and organizations.

In addition, throughout the year, GLMTC advertised its upcoming Luncheon Forums, technical seminars, and other special programs via mailed flyers.

In the fourth quarter, an article about GLMTC and its relationship with AMC appeared in The Manufacturing Innovator, AMC's quarterly newsletter. Samples of marketing efforts are in Appendix M.

Case Studies

A series of case studies on a variety of GLMTC technology transfer projects is being created for use by the TAEs in marketing GLMTC's services.

Library

In 1990, the primary task of the Information Specialist has been to provide literature searches needed by GLMTC staff for projects or by GLMTC client companies. These searches are done on a wide variety of on-line technical databases. Maintaining a database of CAMP clients and expanding the hard-copy library of resource material for GLMTC staff have also occupied a major portion of her time this year.

Evaluation

In 1990, GLMTC continued to document results of its activities through the use of an outside research firm to conduct various evaluations. These included the survey of participants at the May and December Luncheon Forums and project follow-up mentioned earlier in this report, as well as research on SITE Assessments.

NIST GREAT LAKES MANUFACTURING TECHNOLOGY CENTER
1991 BUDGET
(in $ x 1,000)

	ANNUAL BUDGET	FIRST QUARTER ESTIMATED
A. PERSONNEL SALARIES	1,420.0	329.5
B. FRINGE BENEFITS	399.0	92.3
C. TOTAL SALARY AND FRINGE BENEFITS	1,819.0	421.8
D. EQUIPMENT	390.0	97.5
E. DOMESTIC TRAVEL	140.0	35.0
F. CONTRACT COSTS		
MRF SYSTEM INTEGRATION CONTRACT	100.0	50.0
MRF DEMONSTRATION EQUIPMENT MAINTENANCE CONTRACT	300.0	50.0
WRITING CONTRACT SERVICES	70.0	17.5
BUILDING USE:		
DEMONSTRATION AREA	130.0	32.5
OFFICE AREA	41.0	10.3
OTHER CONTRACT COSTS	150.0	37.5
TOTAL CONTRACT COSTS	791.0	197.8
G. OTHER DIRECT COSTS		
TECHNOLOGY TRANSFER EVENTS	150.0	45.0
CLIENT DEVELOPMENT PROJECT COSTS	275.0	50.0
MRF DEMONSTRATION EQUIPMENT LEASE	1,200.0	0.0
MRF DEMONSTRATION EQUIPMENT OPERATIONS EXPENSE	200.0	50.0
REGIONAL EXTENSION PROJECTS	225.0	50.0
GENERAL OFFICE EXPENSES	75.0	19.0
MAILING, PRINTING & DUPLICATING	60.0	15.0
LIBRARY EXPENSES	50.0	15.0
TOTAL OTHER DIRECT COSTS	2,235.0	244.0
H. TOTAL DIRECT COSTS	5,375.0	996.1
I. INDIRECT COSTS	625.0	156.0
J. TOTAL ALL COSTS	6,000.0	1,152.1

PROGRESS MEASURED AGAINST PLAN

In 1990, GLMTC continued to make progress toward the goals outlined in its strategic plan.

Marketing Goals

1. Contact 2,000 companies a year.

   GLMTC has contacted a total of 2,855 new companies in two years. The adoption of a telemarketing approach in the middle of 1990 helped GLMTC achieve the 2,000/year rate in 1990. (Specifically, first-time contacts increased from 96 in the first quarter of 1990 to an average of 501 contacts each of the remaining quarters after telemarketing was adopted.)

2. Perform technical assessments of 200 companies per year.

   The average one-day assessment takes approximately one to two man-weeks from start to presentation of the final report. Given the wide range of duties performed by the TAEs, this goal turned out to be unrealistic. Now that a SITE Assessment procedures manual is available and a TAE has been trained as a SITE specialist, a realistic goal for formal technical assessments is 20 to 25 a year.

   First-time plant visits provide an opportunity for an informal assessment of a company's strengths and opportunities for improvement. Most GLMTC projects and ITAs grow out of these informal assessments. A goal of 300 first-time plant visits a year is realistic; there were 258 in 1989 and 312 in 1990.

3. Maintain contact with all past GLMTC customers.

   Once a company has been contacted and expresses an interest in learning more about GLMTC, a TAE will establish a relationship with the company, identify potential problems and encourage attendance at GLMTC Luncheon Forums and workshops. Each of GLMTC's seven TAEs has an average assignment of about 80 active GLMTC client companies.

4. Provide activities to support getting the desired attendance at GLMTC technology transfer events (Luncheon Forums, workshops, and seminars).

   GLMTC technology transfer events are marketed in three ways - by mail, by TAE contact, and by word-of-mouth. Attendance at Luncheon Forums has increased steadily during 1990, averaging 180 people a forum. Attendance at seminars and workshops has been good (averaging 69 per seminar/workshop), and activities to increase attendance are being explored.

Research during 1991 will help identify topics of interest, desired workshop formats, and other items of interest to workshop participants.

5. Solicit CAMP memberships, with a target of 100 members by January 1, 1991.

This goal has been met. CAMP membership grew to 114 companies by the end of 1990.

Technology Transfer Goals

1. Perform directly (or through a CAMP-affiliated center) 40 significant projects a year.

In 1989, all projects, both small and large, were tracked in the same manner, resulting in 151 projects. In 1990, smaller projects for which clients did not pay and usually requiring an average of eight hours of GLMTC staff time, were classified as ITAs. Using these new categories, GLMTC is above target, with 50 client-funded projects started in 1990. It is expected that this figure can be expanded to 60 projects and 400 ITAs in 1991.

2. Provide 22 technology transfer events, (11 Luncheon Forums and 11 workshops, seminars, or large-scale technology demonstrations. (No events are scheduled in August.)

GLMTC has been averaging about one-and-a-half events a month, including the Luncheon Forums. There were 11 Luncheon Forums and seven GLMTC seminars and workshops. No workshops/seminars were scheduled some months to accommodate three co-sponsored events with other organizations. One seminar, on CAD, was cancelled due to limited client registration.

3. Operate and maintain the MRF as a manufacturing technology demonstration facility.

This has been one of GLMTC's most difficult goals. The machines required to operate the MRF as a demonstration facility turned out to be too expensive. Therefore, a "Partnership With Industry" strategy was adopted. This necessitated a lengthy process of defining requirements, creating Requests for Proposals, reviewing bid responses to the RFPs, and, in some cases, revising the RFPs to better reflect the equipment available. All purchases then had to be approved by the State Board of Regents. (The MRF is a joint project with the Unified Technologies Center, a program of Cuyahoga Community College.)

In addition, it became clear that significant renovations to the planned MRF space would be necessary. Delays in these renovations also set back the start date for MRF operation.

However, the last of these problems are about to be overcome. The equipment has arrived and the building renovations are being wrapped up. Some demonstration capability already exists. In addition, relationships with other organizations have been finalized which will immediately place the MRF at the cutting edge of new technology. For example, the Air Force's Rapid Design System will be available to MRF users.

4. Respond effectively to technology hot-line requests by CAMP members.

GLMTC has achieved this goal and expanded it. GLMTC responds to calls from CAMP members and non-Camp members. It takes calls from manufacturers almost anywhere in the eastern half of the United States. Because of the extensive resource network being developed by the Regional Coordinator, the participation by GLMTC staff in professional technical organizations, and the expertise and database resources available through the Information Specialist, GLMTC has become the one-call-does-it-all source of technological resources for small and mid-sized manufacturers.

Evaluation Goals

1. Develop and maintain a system for evaluating GLMTC technology transfer events.

Impact data from the Luncheon Forums has been collected almost from the beginning of the program and has consistently documented both financial and other benefits to companies attending.

Participant feedback on the quality and value of the workshops has been collected on a regular basis. An effort to do long-term follow-up (six months later) to ascertain economic or organizational impact from the seminars and workshops has not yet been made.

A questionnaire has been developed, tested, and administered to periodically evaluate SITE Assessments. Results were reported in earlier 1990 quarterly reports.

2. Develop and maintain a system for evaluating GLMTC projects.

A questionnaire has been developed, tested, and administered to periodically follow-up on completed projects. The first report of results from the use of this questionnaire appears in the project section of this report. It is anticipated that this questionnaire will be administered to all companies that have completed projects with GLMTC.

In addition, a questionnaire to follow-up on rejected proposals has also been designed, tested and administered.

Due to the low rejection rate of GLMTC proposals, it is not anticipated that this questionnaire will be used unless the rejection rate rises above 50 percent.

3. Develop and maintain a tracking system for the activities and current status of GLMTC marketing activities.

The database for tracking GLMTC client interactions outgrew the computer system for which it was designed before it could become fully operational. This necessitated identifying and programming a new system - INGRESS. This system is now substantially complete and will be fully operational and on-line to the internal employee network in January, 1991.

4. Develop and maintain a tracking system for the progress against plan of GLMTC projects.

The database which tracks all GLMTC client interactions also provides a tracking system for progress against plan of GLMTC projects, from pre-proposal through completion. This will be the primary tracking system in use in 1991. A manual tracking system was utilized up to this point.

Other Issues

At the end of 1989, GLMTC added another goal - to provide training for GLMTC staff that would enable them to develop cost/savings analyses for all significant projects so that GLMTC could document the economic benefit of its projects. This is now in place and GLMTC has been providing estimates of project economic impact since the second quarter of the year.

In addition, the Project follow-up, SITE Assessment follow-up, and Luncheon Forum surveys have all provided program impact information. In 1991, GLMTC will assess whether it is feasible to collect economic impact of ITAs, since so many are performed. A sample of five ITAs in the third quarter indicated a probable economic benefit to the companies of over $1 million.

Summary

GLMTC's goals have been realistic and have, for the most part, been attained. In addition, the Great Lakes Manufacturing Technology Center has gained a reputation as a key resource for small and mid-sized manufacturing companies throughout Northeast Ohio, the Great Lakes region, and beyond. It has developed a broad-ranging set of resources that includes:

- Competent staff with a wide range of technical and managerial skills in manufacturing;

- Access to a variety of technical research databases and other written resources;

* A network of technical support agencies and organizations across the eastern part of the United States.

Where resources have been limited, GLMTC has encouraged and supported the development of new ones, such as training Lorain County Community College personnel to provide assistance for small manufacturers in their area.

In 1991, refinement of telemarketing approaches, SITE Assessment techniques, and marketing resources for TAEs will enable the program to attain its strategic goals. Some goals have been modified to more realistically reflect the realities of the program. New marketing goals for 1991 include:

1. Make new company contacts at the rate of 2,000 per year.
2. Provide 20 to 25 SITE Assessments.
3. Provide technology transfer events, such as the Luncheon Forums and technology workshops and seminars, that will attract 4,000 people a year.
4. Carry out 60 client-funded projects and 400 ITAs a year.
5. Carry out 300 first-time plant visits per year.

Appendix H

Economic Impact of Projects

1 9 9 0
FOURTH QUARTER ESTIMATED
ECONOMIC IMPACT DATA TO GLMTC PROJECTS

COMPANY ID	TYPE OF IMPACT PROCESS	$ IMPACT
6065	Inventory Reduction	$1,300,000
Total	For Inventory Reduction	$1,300,000
5880	Process Improvement	$1,130,000
6295		$ 500,000
8553		$ 10,000
8553		$ 400,000
8958		$ 250,000
Total	For Process Improvement	$2,290,000
5035	Revenue Increase	$3,000,000
Total	For Revenue Increase	$3,000,000
8607	Cost Avoidance	$ 5,000
Total	For Cost Avoidance	$ 5,000
Total For all Categories (REFERENCE ONLY)		$6,595,000

1990
Annual Estimated
Economic Impact Data to GLMTC Projects

mpany ID	Type of Impact Process	$ IMPACT
8561	Cost Avoidance	$1,500,000
8607		$5,000
Total		$1,505,000
0322	Inventory Reduction	$565,000
5317		$42,000
6065		$1,300,000
7464		$2,500,000
8501		$150,000
8560		$310,000
8792		$2,400,000
8946		$4,150,000
8946		$700,000
Total		$12,117,000
0322	Revenue Increase	$15,000,000
0425		$200,000
0711		$1,000,000
5035		$3,000,000
5091		$300,000
5564		$20,000
5680		$1,000,000
8505		$2,100,000
8554		$10,000,000
8560		$1,700,000
8565		$300,000
8652		$250,000
8871		$7,500,000
8946		$10,100,000
Total		$52,470,000

Company ID	Impact Process	$ IMPACT
1389	Process Improvement	$75,000
1829		$400,000
5564		$150,000
5880		$1,130,000
6015		$385,000
6065		$150,000
6065		$50,000
6065		$50,000
6265		$500,000
6563		$30,000
6915		$10,000
7285		$3,360,000
7437		$200,000
7464		$150,000
7722		$25,000
7850		$250,000
8157		$75,000
8157		$3,500,000
8180		$770,000
8230		$360,000
8528		$100,000
8533		$10,000
8553		$400,000
8554		$26,000
8557		$10,000
8713		$30,000
8754		$50,000
8789		$10,000
8836		$100,000
8805		$100,000
8839		$45,000
8870		$100,000
8871		$50,000
8936		$15,000
8946		$630,000
8958		$250,000
8958		$190,000
8978		$1,000,000
Total		$14,736,000
Grand Total		$80,828,000

Mr. **Valentine**. Thank you, sir.

Ms. Mayhew.

STATEMENT OF JEAN MAYHEW, MANAGER, UNITED TECHNOLOGIES LIBRARY AND INFORMATION SERVICES, EAST HARTFORD, CONNECTICUT

Ms. **Mayhew**. Mr. Chairman, I am the manager of United Technologies Library and Information Services. United Technologies Corporation, based in Hartford, Connecticut, provides a broad range of high technology products and support services to the aerospace, building systems, and automotive industries. We at United Technologies for providing us with this opportunity to provide comments concerning the National Technical Information Service.

Access to technical information is critical to the success of United Technologies in a competitive global market. NTIS is the cornerstone of our program to make Federal scientific and technical information widely available throughout the corporation. Everyday, our engineers use numerous NTIS products as reports, microfiche, or computer software.

We strongly endorse the President's request for a $1.5 million for modernization of NTIS services and operations for fiscal year 1992.

In spite of the current usage of NTIS products and services, elements of Federal scientific and technical information we need to remain competitive are just not readily available. In order to meet industry expectations for its products and services, NTIS must incorporate advances in information technology.

United Technologies currently places most of our orders with NTIS electronically. We dial into their computer and list the order numbers of the documents needed along with our own identification number. Why would we want to do this? Electronic ordering gets the document to us approximately a week sooner than traditional methods because the request does not travel through the mail and requires minimal processing within NTIS. This is one example of the positive results of modernization. Unfortunately, there are far more opportunities for improvement at NTIS than there are success stories right now. Let me describe one of these opportunities.

I recently toured the NTIS facility in Springfield, Virginia. There is a room there that I wish each of you could visit. It is used for what is euphemistically called "automatic distribution of microfiche to NTIS customers." By the way, this is an example of 1960s technology. This room reminds me of an old fashioned post office. It has partitions with hundreds of small individual bins for sorting microfiche. Twice a month the computer keypunch card which lists the subjects of interest to United Technologies is put in a slot. If a bin contains a microfiche on a topic of interest to UTC, a little light bulb flashes on at the top of the bin. An individual then takes a microfiche from each bin with a light on and puts it in a box destined for United Technologies. The opportunities for error are endless. One light bulb fails and United Technologies may end up not receiving the latest report on composite material.

Mr. **Valentine**. Do they have a hand stamp?

Ms. MAYHEW. No, no, not even a hand stamp. The individual pulling the microfiche is interrupted and we get nothing on artificial intelligence. Okay. That key punch card, a technology that the UTC library network has not used for nearly a decade, becomes bent and we no longer get aerospace reports, we're out of the aerospace industry.

This is the technology which is currently being used to distribute technical information which represents the product of billions of Federal R&D dollars. NTIS also needs funds to modernize its financial systems, its inventory control processes, and its document delivery procedures.

United Technologies encourages the committee to support the $1.5 million request in the President's budget to continue modernization of this valuable national resource.

In addition, we ask your assistance in providing the mechanisms to ensure that NTIS has complete coverage of Federal scientific and technical information. The following quote is from an address by Doctor Alan Bromley. "The existence of information does not guarantee its use. Data that are not accessible to scientists who need it or who are not even aware of its existence are of little value. Technologies cannot be transferred from national laboratories to private industries if companies, especially small companies, cannot discover its existence."

We in industry continue to have problems identifying and procuring Federal scientific and technical information. It is critical that we have access not only to today's information but also the historical data which represents our national knowledge base. NTIS is responsible for maintaining the Federal research in progress database. Unfortunately, this file is incomplete because the Federal agencies do not provide NTIS with current research data.

Industry needs to be able to identify research in progress which is being sponsored through Federal funding. Too often a Federal scientist is working on a project which is being duplicated in the private sector. By monitoring Federal research in progress, industry can maximize its own R&D investment and ultimately convert this knowledge into commercial products. When the Federally-supported scientist finishes his research, he produces a product. Doctor Lester Crowe, recently retired VP of research and development for the 3M company, states that the product of the laboratory is information. Too often this information product is shared with a few colleagues instead of being deposited with NTIS where it becomes generally available.

One characteristic of industrial R&D application is that we are never sure when we will need access to this information. We are continually going back to the basic technology covered during the 1940s, 1950s, and 1960s to build the products of tomorrow. We rely on NTIS to provide access not only to the documentation produced yesterday, but also 20 or 30 years ago. And so we encourage the support of indefinite retention of this documentation. As an example, this month NTIS provided overnight delivery for three documents for a company in Harrisburg, Pennsylvania. What is unusual about the situation? Nothing, except that the documents were originally produced in 1966 and had never been previously sold by

NTIS. They must have been important for the company to spend the money on overnight delivery. In this case, the system worked. But where would the company have gone for these documents if NTIS did not have them? Would the office still have copies on file? Would the department where he works still be there?

Too often NTIS does not have the information. The Federal Research in Progress database, which it maintains, is incomplete, a document that industry needs was never deposited with NTIS. And every time industry is frustrated in accessing Federal information, we, as a Nation, are less competitive than we could be.

Your support is needed to provide the mechanisms which ensure that coverage of today's Federal scientific and technical information is complete, and that the technical heritage—those documents produced decades ago—will continue to be available as building blocks for future advancements.

Doctor Wayne Burwell, director of research at United Technologies Corporation, states the following in his president's message to the Industrial Research Institute: "As professionals involved in R&D, we are accustomed to change. In fact, we often think of ourselves as principal agents of change. Today, however, change has become more difficult to manage, not just because of the time gradient, but also because it is extensive and multidimensional. To paraphrase a familiar show tune, 'change is busting out all over.' Change is now so fundamental that we are left with only two real strategic choices for the 1990s. We can either become masters of change or victims of change. We will be one or the other long before the end of the decade."

Implementing changes in information technology will be one of the key challenges facing the Federal Government and industry in the 1990s. NTIS needs the support of this committee in order to meet the full range of industry expectations. We strongly endorse the President's request for $1.5 million for modernization of NTIS for fiscal year 1992. We ask your assistance in providing the mechanisms which will ensure complete coverage of today's Federal and scientific technical information and continued access to the historical documentation which represents our technical heritage.

Thank you, Mr. Chairman, for the opportunity to share our thoughts on the importance of access to Federal scientific and technical information.

[The prepared statement of Ms. Mayhew follows:]

TESTIMONY
OF
JEAN MAYHEW
BEFORE THE
HOUSE SUBCOMMITTEE ON
TECHNOLOGY AND COMPETITIVENESS

FEBRUARY 26, 1991

Mr. Chairman, my name is Jean Mayhew. I am the manager of United Technologies Library & Information Services. United Technologies Corporation (UTC), based in Hartford, Connecticut, provides a broad range of high-technology products and support services to the aerospace, building systems and automotive industries.

We at United Technologies thank the Committee for providing us with the opportunity to provide comments concerning the National Technical Information Service (NTIS).

Access to technical information is critical to the success of United Technologies in a competitive global market. NTIS is the cornerstone of our program to make federal scientific and technical information widely available throughout the corporation. Every day our engineers use numerous NTIS products - as reports, microfiches or computer software.

- We strongly endorse the President's request for $1.5 million for modernization of NTIS services and operations for FY 1992.

- In spite of the current usage of NTIS products and services, elements of federal scientific and technical information we need to remain competitive are not readily available.

MODERNIZATION IS A PRIORITY

In order to meet industry expectations for its products and services, NTIS must incorporate advances in information technology.

United Technologies currently places most of our orders with NTIS electronically. We dial into their computer and list the order numbers of the documents needed along with our identification number. Why would we want to do this? Electronic ordering gets the document to us approximately a week sooner than traditional methods because the request does not travel through the mail and requires minimal processing within NTIS.

This is one example of the positive results of modernization. Unfortunately, there are far more opportunities for improvement at NTIS than there are success stories.

Let me describe one of these opportunities.

I recently toured the NTIS facility in Springfield, Virginia. There is a room that I wish each of you could visit. It is used for what is euphemistically called "automatic" distribution of microfiches to NTIS customers. By the way, this is an example of 1960's modernization.

This room reminds me of an old-fashioned post office. It has partitions with hundreds of small individual bins for sorting microfiches. Twice a month a computer keypunch card which lists the subjects of interest to United Technologies is put in a slot. If a bin contains a microfiche on a topic of interest to UTC, a little light bulb flashes on at the top of the bin. An individual then takes a microfiche from each bin with a light on and puts it in a box destined for United Technologies.

The opportunities for error are endless. One light bulb fails and United Technologies may end up not receiving the latest report on composite materials. The individual pulling the microfiches is interrupted and we get nothing on artificial intelligence. That keypunch card - a technology that the UTC library network has not used for nearly a decade - becomes bent and we no longer get aerospace reports.

This is the technology which is currently being used to distribute technical information which represents the product of billions of federal R&D dollars. NTIS also needs funds to modernize its financial systems, its inventory control processes and its document delivery procedures.

United Technologies encourages the committee to support the $1.5 million request in the President's budget to continue modernization of this valuable national resource.

ACCESS TO FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION

In addition, we ask your assistance in developing the mechanisms to insure that NTIS has complete coverage of federal scientific and technical information.

The following quote is from an address by Dr. D. Allan Bromley to the Forum on Federal Information Policies of the Federal Library and Information Center Committee.[1]

> ...the existence of information does not guarantee its use. Data that are not accessible to scientists who need it or who are not even aware of its existence are of little value. Technologies cannot be transferred from national laboratories to private industry if companies--especially small companies--cannot discover its existence.

We in industry continue to have problems identifying and procuring federal scientific and technical information. It is critical that we have access not only to today's information but also the historical data which represents our national knowledge base.

NTIS is responsible for maintaining the Federal Research-In-Progress (FEDRIP) database. Unfortunately, this file is incomplete because the federal agencies do not provide NTIS with documentation on their research. Industry needs to be able to identify research-in-progress which is being sponsored through federal funding. Too often a federal scientist is working on a project which is being duplicated in the private sector. By monitoring federal research-in-progress, industry can maximize its own R&D investment and ultimately convert this knowledge into commercial products.

When the federally-supported scientist finishes his research, he produces a product. Dr. Lester C. Krogh, recently retired vice president for research and development for the 3M Company, states that "the product of the laboratory is information."[2] Too often this information product is shared with a few colleagues instead of being deposited with NTIS where it becomes generally available.

One characteristic of industrial R&D application is that we are never sure when we will need access to this information. We are continually going back to the basic technology covered during the 1940's, 1950's and 1960's to build the products of tomorrow. We rely on NTIS to provide access not only to the documentation produced yesterday but also twenty or thirty years ago and so we encourage the support of indefinite retention.

As an example, this month NTIS provided overnight delivery for three documents for a company in Harrisburg, Pennsylvania. What is unusual about this situation? Nothing, except that the documents were originally produced in 1966 and had never been previously sold by NTIS. They must have been important for the company to spend the money on overnight delivery. In this case, the system worked but where would the company have gone for these documents if NTIS did not have them? Would the author still have copies on file - if he is still working? Would the department where he worked still be there - if it hasn't changed names or been absorbed over the years?

Too often NTIS does not have the information. The Federal Research-In-Progress database which it maintains is incomplete. The document that industry needs was never deposited with NTIS. And every time industry is frustrated in accessing federal information, we as a nation are less competitive than we could be.

Your support is needed to provide the mechanisms which insure that coverage of today's federal scientific and technical information is complete and that the technical heritage - those documents produced decades ago - will continue to be available as building blocks for future advancements.

CONCLUSION

Dr. Wayne G. Burwell, director of research at United Technologies Corporation, states the following in his President's Message to the Industrial Research Institute:[3]

> As professionals involved in R&D, we are accustomed to change.

> In fact, we often think of ourselves as principal agents of change. Today, however, change has become more difficult to manage, not just because of the time gradient, but also because it is extensive and multidimensional. To paraphrase a familiar show tune, change "is busting out all over." Change is now so fundamental that we are left with only two real strategic choices for the 1990s. We can either become masters of change, or victims of change. We will be one or the other long before the end of the decade.

Implementing changes in information technology will be one of the key challenges facing the federal government and industry in the 1990s.

NTIS needs the support of this committee in order meet the full range of industry expectations. We strongly endorse the President's request for $1.5 million for modernization of NTIS services and operations for FY 1992. We ask your assistance in providing the mechanisms which will insure complete coverage of today's federal and scientific technical information and continued access to the historical documentation which represents our technical heritage.

Thank you, Mr. Chairman, for the opportunity to share our thoughts on the importance of access to federal scientific and technical information.

1. Dr. D. Allan Bromley, "Managing Scientific and Technical Information in the 1990's." An address to the Forum on Federal Information Policies of the Federal Library and Information Center Committee. Library of Congress. Washington, D.C. March 21, 1990. P. 4.

2. Dr. Lester C. Krogh, "Measuring and Improving Laboratory Productivity and Quality," Research Management Vol. 30, No. 6, November-December 1987, p. 22.

3. Dr. Wayne G. Burwell, "President's Message," Industrial Research Institute 1990 Annual Report. Washington, DC: Industrial Research Institute, 1990. P. 2.

Jean G. Mayhew

Manager, United Technologies
Library & Information Services

United Technologies Research Center, 129-01
Silver Lane
East Hartford, CT 06108

(203) 727-7595

Accomplishments:

- Manage a network of 11 libraries located in 3 states which provides technical and business information support to scientists, engineers and management in a highly diversified Fortune 500 company.
- Established and chaired an industrial advisory committee to the National Technical Information Service.
- Keynote speaker at the 1989 NTIS Annual User's Conference. Topic: "Access to Federal Information from the Users Perspective"

Experience at United Technologies:

1987-	Manager, Library & Information Services
1984-1987	Supervisor, Branch Libraries
1979-1984	Senior Librarian, Hamilton Standard
1978-1979	Librarian, Pratt & Whitney Aircraft
1972-1978	Library Associate, Research Center

Education:

MBA	Rensselaer Polytechnic Institute/ Hartford Graduate Center	1982	
MLS	Southern Connecticut State University	1978	
BA	University of New Hampshire	1972	Magna Cum Laude

Professional Affiliations:

- American Institute of Aeronautics and Astronautics
  - Chairperson, Technical Information TC 1990-
- Special Libraries Association
  - Connecticut Valley Chapter President 1984-1985
- Industrial Technical Information Managers Group
  - NTIS Advisory Committee, Chairperson, 1987-
- Conference Board
  - Information Services Advisory Council, 1988-
- EI (Engineering Index), Inc.
  - Advisory Board, 1985-
  - Advisory Committee on Scope and Coverage, 1989-
- Associated Information Managers
- American Society for Information Science

Honor Societies:

Phi Beta Kappa   Phi Kappa Phi   Beta Phi Mu

Mr. VALENTINE. Thank you.

Doctor Cox?

STATEMENT OF GERALDINE COX, CHAIRMAN, ENGINEERING AFFAIRS COUNCIL, AMERICAN ASSOCIATION OF ENGINEERING SOCIETIES, WASHINGTON, D.C.

Dr. COX. Mr. Chairman and members of the subcommittee, I am Doctor Geraldine Cox, the Society of Women Engineers. I am here today on behalf of the American Association of Engineering Societies where I serve as chairman of the Engineering Affairs Council. Professionally, I am Vice President and Technical Director of the Chemical Manufacturers Association. As an aside, I might also add that at one time I was on one of the Review Committees for the old NBS, and at that time, the facilities needed repair and I think they still do from my subsequent visits there recently.

Mr. VALENTINE. Could I just say this. We have in the American Technology Preeminence legislation, which will be introduced, we do have an item in there which would at least begin to correct the problem to the extent of $1.5 million, if that's adopted. Excuse me, please go ahead.

Dr. COX. That's fine. I might also add that in my background in environmental safety and health, it is clear to me that many of the environmental and safety items that are requested are really necessary.

The American Association of Engineering Societies is a multidisciplined organization of engineering societies dedicated to advancing knowledge, understanding, and practice of engineering in the public interest. The member societies of the AAES represent over half a million engineers in industry, Government, and education. A list of our membership is included; I will not go through them now.

Considering the vital role of our member societies and their members that play in development, advancement, and use of technologies, we have a special interest in reauthorization of the National Institute of Standards and Technology. AAES supports U.S. international competitiveness as a major overriding goal for the Nation. We encourage its consideration in the development of all national policy decisions. Additionally, AAES encourages the further development and implementation of the National Technology Policy focused on research, development, commercialization, and future competitiveness. The linkage between technology development, a vigorous economy, international competitiveness, and improvement in the quality of life must be recognized.

NIST plays an essential role in supporting the Nation's science and technology base, as well as being the primary Federal laboratory supporting the international competitiveness of U.S. business. The Omnibus Trade and Competitiveness Act of 1988 assigned NIST the responsibility to help industry develop the technology needed to improve product quality, modernize manufacturing processes, and encourage the rapid commercialization of products based on new scientific discoveries.

AAES strongly supports the fiscal year 1992 budget request of $248 million for NIST. This is an increase of 50 percent that, combined with increases from the fiscal year 1991 budget, represents significant additional resources for NIST. However, at the same time, NIST's mission has expanded. AAES is concerned that budget increases have not kept pace with the expansion of these programs. Although these new missions should be continued and enhanced, we strongly urge Congress to provide the additional resources necessary for full implementation. NIST must have the strong support in both the Administration and Congress for it to achieve its mission to enhance U.S. competitiveness.

AAES supports the Administration's request for $201.8 million for intramural research. This represents an increase of $22 million and indicates that the Administration's commitment to these vital research areas. We encourage Congress to support the Administration by providing authorization and funding necessary for these programs.

AAES acknowledges the formation of the Building and Fire Research Laboratory, EFRL—that does not make a good acronym — in the fiscal year 1992 budget as part of an agency-wide reorganization at NIST. With the exception of two necessary modifications, AAES generally supports the Administration's $10.6 million request for this group, the first funding increase in the area since 1974.

In addition, $1 million has been recommended for NIST's role in the National Earthquakes Hazards Reduction Program, which will include work with professional trade and standards organizations to plan and conduct research and development for seismic design and construction standards for new and existing life lines, public works, and utility systems. Formerly known as the Centers for Building Technology in the Fire Research, the new unit will focus on increasing the usefulness, safety, and economy of constructing facilities and reducing the human and economic costs of unwanted fires. The vital research program will integrate considerations for performance, safety, and economy of the design, construction and use of buildings, and other constructed facilities, their contents and vehicles. The five technical divisions from the two previous Centers will continue—structures, building materials, building environment, fire science and engineering, and fire measurement and research.

AAES recommends that $350,000 in administrative savings claimed for the consolidation be invested in programmatic activities for the BFRL, and that $250,000 be restored for ongoing fire research on the ignition of upholstered furniture.

AAES welcomes the proposed increase for $15 million in the computer systems programs areas. NIST plays a small but crucial role in U.S. information technology, an area where the U.S. world leadership position is slipping. Among important programs in this area are additional responsibilities under the Computer Security Act of 1987 to develop methods to protect against computer viruses, worms, and other malicious software.

The Integrated Service Digital Network is another important program for which the Administration has proposed funding increases; in this case, $1.65 million. ISDN would permit the simultaneous transmission of text, voice, images, and data over telephone lines. European technology providers are well on the way to interoperability, while U.S. manufacturers lack clear standards. NIST is performing the crucial role of bringing U.S. industry together to reach a consensus on ISDN standards. Increased funding for both of these areas is welcomed. However, it is not adequate for NIST to achieve the results envisioned for these programs.

AAES is pleased with, and fully supports, the Administration's request for $33.6 million for electronics and electrical engineering, an increase of 57.9 percent over last year. This increase will permit NIST to provide U.S. industry assistance in competing with Japanese and European Community corporations in emerging product areas. Among the research programs that would benefit from this proposed increase are magnetic measurements, superconductivity, measurement methods and standards for microwave products, semiconductor measurements, and lightwave measurement technology.

The proposed doubling of funding for manufacturing engineering is also welcomed by AAES. Funding at the proposed level of $12.6 million would permit funding of base programs to develop standards and measurements for online quality control during manufacturing, improve design communication between different manufacturers, and control systems for robots and automated productions. Funds would also be available for the new initiatives to expand the intelligent machine research program and increase efforts to reduce an international data product exchange standard.

AAES agrees with the proposed increase in funding to $20.8 million for chemical science and technology. Improvements in chemical measurements and standards would go a long way toward cutting costs for high technology industry. In some manufacturing processes, chemical testing can account for up to 80 to 90 percent of unit production costs. Optical and electrochemical sensors to be developed by NIST under this initiative would permit industry to make online measurements that would significantly reduce the number of rejected products and the amount of waste created during manufacturing.

AAES supports the proposed budget of $26.6 million for physics research. This research is necessary for long-term studies needed to provide the science for future generation measurement technology.

AAES endorses the proposed 8.2 percent increase to funding for material science and engineering. Recent advances allow researchers to create structures and combinations of elements that have important industrial applications. Under this program, NIST researchers will work to develop the generic technology necessary for measurement standards which, in turn, would lead to reliable processed knowledge.

The AAES strongly supports the goals of the Advanced Technology Program to encourage the cooperative technology development efforts between industry, universities, and the Government. This program, along with the Manufacturing Technology Centers, are unique Government programs in that corporations share the financial risk of developing and implementing new manufacturing technologies. Given adequate resources, ATP can and should play a vital role in promoting U.S. technology development. However, ATP should not be allowed to drain off resources essential for NIST's critical standards role.

The Administration's request for Government contributions to ATP is $35.9 million, equal to last year's funding level. While AAES supports the request, we would encourage additional funding. Congress should consider the funding levels provided for in the American Technology Preeminence Act, which calls for funding ATP at a level of $100 million in fiscal year 1992 and doubling it in the following year.

The budget request of $10.3 million for the MTC program represents a decrease of 13.5 percent; however, $3.4 million will be carried over from fiscal year 1991. The five existing Centers have done a great service by providing the technology transfer of new standardized manufacturing techniques to small- and medium-sized companies. If we are truly concerned about our Nation's competitiveness, we must continue to support programs such as these which give smaller companies resources to grow and be more competitive. While both ATP and MTC programs are considered experimental, their support and popularity with industry is a sign of success.

With new missions and focuses, it is vital that the standards activities of NIST not be overlooked. The role of standards in ensuring U.S. international competitiveness cannot be overestimated. With the advent of European economic integration, U.S. exports will face the problem of dealing with different national technical standards. It is essential that the Government, through NIST, accept a stronger role in support of U.S. standards and accreditation issues in negotiations with other governments.

AAES encourages a two-year budget reauthorization for NIST. Long-range planning is critical to meeting technological and competitive challenges facing the U.S. AAES urges your support for NIST and its programs. Strong leadership in technology policy and support for NIST are necessary to ensure continued U.S. competitiveness. Appropriate funding levels are essential for NIST to achieve its mission and continue its important role in supporting the Nation's science and technology.

AAES applauded the creation of the Office of Under Secretary of Commerce and Technology. We encourage further development and implementation of the national Technology Policy that focuses responsibility within the Federal Government. There must be a centralized authority to promote technology development, conduct impact assessment of proposed regulations on the Nation's economic competitiveness, and coordinate and support research and development efforts. Such authority should be located at a cabinet level.

Thank you for the opportunity to present the views of the American Association of Engineering Societies on the reauthorization of the National Institute of Standards and Technology.

[The prepared statement of Dr. Cox follows:]

AAES

American Association of Engineering Societies
1111 Nineteenth Street, N.W. • Suite 608 • Washington, DC 20036-3690
(202) 296-2237 • Fax (202) 296-1151

TESTIMONY OF

Dr. GERALDINE COX

CHAIR, ENGINEERING AFFAIRS COUNCIL

OF THE

AMERICAN ASSOCIATION OF ENGINEERING SOCIETIES

ON

REAUTHORIZATION OF THE

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY

before the

SUBCOMMITTEE ON TECHNOLOGY AND COMPETITIVENESS

of the

U.S. HOUSE OF REPRESENTATIVE

COMMITTEE ON SCIENCE, SPACE AND TECHNOLOGY

February 26, 1991

Engineering – Renewing America Through Technology And Innovation

Mr. Chairman and members of the Subcommittee, I am Dr. Geraldine Cox of the Society of Women Engineers. I am here to testify today on behalf of the American Association of Engineering Societies, which I serve as Chairman of the Engineering Affairs Council. Professionally I am Vice President and Technical Director of the Chemical Manufacturers Association.

The American Association of Engineering Societies is a multidisciplinary organization of engineering societies dedicated to advancing the knowledge, understanding, and practice of engineering in the public interest. The member societies of AAES, which represent over half a million engineers in industry, government, and education, include:

- American Society of Civil Engineers
- American Society of Mechanical Engineers
- Institute of Electrical and Electronics Engineers
- American Society for Engineering Education
- Optical Society of America
- National Institute of Ceramic Engineers
- Society of Women Engineers
- Society of Fire Protection Engineers
- American Institute of Plant Engineers
- American Nuclear Society
- American Indian Science and Engineering Society

Considering the vital role our member societies, and their members, play in the development, advancement, and utilization of technology, we have a special interest in reauthorization of the National Institute of Standards and Technology (NIST). AAES supports U.S. international competitiveness as a major overriding goal for the nation. We encourage its consideration in the development of all national policy decisions. Additionally, AAES encourages the further development and implementation of a national technology policy focused upon research, development, commercialization, and future competitiveness. The linkage between technology development, a vigorous economy, international competitiveness, and improvement in the quality of life must be recognized.

NIST plays an essential role in supporting the nation's science and technology base as well as being the primary federal laboratory supporting the international competitiveness of U.S. business. The Omnibus Trade and Competitiveness Act of 1988 assigned NIST the responsibility to help industry develop the technology needed to improve product quality, modernize manufacturing processes, and encourage the rapid commercialization of products based on new scientific discoveries.

AAES strongly supports the Fiscal Year (FY) 1992 budget request of $248 million for NIST. This is an increase of 15 percent that, combined with increases from the FY 1991 budget, represents significant additional resources for NIST. However, at the same time, NIST's mission has been expanded. AAES is concerned that the budget increases have not kept pace with the expansion of programs. Although these new missions should be continued and enhanced, we strongly urge the Congress to provide the additional resources necessary for full implementation. NIST must have strong support in both the Administration and Congress for it to achieve its mission and enhance U.S. competitiveness.

INTRAMURAL RESEARCH PROGRAMS

AAES supports the Administration's request for $201.8 million for NIST intramural research programs. This represents an increase of $22 million and indicates the Administration's commitment to these vital research areas. We encourage Congress to support the Administration by providing the authorization and funding necessary for these programs.

AAES acknowledges the formation of the Building and Fire Research Laboratory (BFRL) in the FY 1992 Budget as part of an agency-wide reorganization at NIST. With the exception of two necessary modifications, AAES generally supports the Administration's $10.6 million request for BFRL, the first funding increase in this area since 1974. In addition, $1 million has been recommended for NIST's role in the national Earthquake Hazards Reduction Program (NEHRP), which will include work with professional, trade and standards organizations to plan and conduct research and development for seismic design and construction standards for new and existing lifelines (public works and utility systems).

Formerly known as the Centers for Building Technology (CBT) and Fire Research (CFR), the BFRL will focus on increasing the usefulness, safety and economy of constructed facilities, and reducing the human and economic costs of unwanted fires. BFRL's vital research program will integrate considerations for performance, safety and economy for the design, construction and use of buildings, other constructed facilities, their contents and vehicles. The five technical divisions from the two previous centers will continue: Structures, Building Materials, Building Environment, Fire Science and Engineering, and Fire Measurement and Research. AAES recommends that the $350,000 in administrative savings claimed for consolidation of CBT and CFR be invested in BFRL's programmatic activities and $250,000 should be restored for ongoing fire research on ignition of upholstered furniture.

AAES welcomes the proposed increase to $15 million in the computer systems program areas. NIST plays a small but crucial role in U.S. information technology, an area where the U.S. world leadership position is slipping. Among the important programs in this area are additional responsibilities under the Computer Security Act of 1987 to develop methods to protect against computer "viruses," "worms," and other malicious software. The Integrated Service Digital Network (ISDN) is another important program for which the Administration has proposed funding increases, in this case, $1.65 million. ISDN would permit the simultaneous transmission of text, voice, images, and data over telephone lines. European technology providers are well on the way to interoperability, while U.S. manufacturers lack clear standards. NIST is performing the critical role of bringing U.S. industry together to reach a consensus on ISDN standards. Increased funding for both of these areas is welcome; however, it is not adequate for NIST to achieve the results envisioned for these programs.

AAES is pleased with and fully supports the Administration's request for $33.6 million for electronics and electrical engineering, an increase of 57.9 percent over last year. This increase will permit NIST to provide U.S. industry assistance in competing with Japanese and European Community corporations in emerging product areas. Among the research programs that would benefit from this proposed increase are magnetic measurements, superconductivity, measurement methods and standards for microwave products, semiconductor measurements, and lightwave measurement technology.

The proposed doubling of funding for manufacturing engineering is also welcomed by the AAES. Funding at the proposed level of $12.6 million would permit funding of base programs to develop standards and measurements for on-line quality control during manufacturing, improve design communication between different manufacturers, and control systems for robots and automated productions. Funds would also be available for new initiatives to expand the intelligent machine research program and increase efforts to produce an international product data exchange standard.

AAES agrees with the proposed increase in funding to $20.8 million for chemical science and technology. Improvements in chemical measurements and standards would go a long way toward cutting costs for high-technology industry. In some manufacturing processes, chemical testing can account for up to 80 to 90 percent of unit production costs. Optical and electrochemical sensors to be developed by NIST under this initiative would permit industry to make on-line measurements that would significantly reduce the number of rejected products and the amount of waste created during manufacturing.

AAES supports the proposed budget of $26.6 million for physics research. This research is necessary for long-term studies needed to provide the science base for future generation measurement technology.

AAES endorses the proposed 8.2 percent increase to funding for material science and engineering. Recent advances allow researchers to create structures and combinations of elements that are unknown in nature but have important industrial applications. Under this program, NIST researchers will work to develop the generic technology necessary for measurement standards which in turn would lead to reliable process technologies.

EXTRAMURAL PROGRAMS

The AAES strongly supports the goals of the Advanced Technology Program (ATP) to encourage the cooperative technology development efforts between industry, universities and government. This program, along with the Manufacturing Technology Centers (MTC), are unique government programs in that Corporations share the financial risk of developing and implementing new manufacturing technologies. Given adequate resources, ATP can and should play a vital role in promoting U.S. technology development. However, ATP should not be allowed to drain off resources essential for NIST's critical standards role. The Administration's request for the government's contribution to ATP is $35.9 million, equal to last year's funding level. While AAES supports the request, we would encourage additional funding. Congress should consider the funding levels provided for in the American Technology Preeminence Act which calls for funding ATP at a level of $100 million in FY 1992 and doubled it the following year.

The budget request of $10.3 million for the MTC program represents a decrease of 13.5 percent; however, $3.4 million will be carried over from fiscal year 1991. The five existing centers have done a great service by providing for the technology transfer of new standardized manufacturing techniques to small and medium sized companies. If we are truly concerned about our nation's competitiveness, we must continue support for programs such as these which give smaller companies the resources to grow and be more competitive. While both the ATP and MTC programs are considered experimental, their support and popularity with industry is a sign of success.

STANDARDS ACTIVITIES

With new missions and focuses, it is vital that the standards activities of NIST are not overlooked. The role of standards in ensuring U.S. international competitiveness cannot be overestimated. With the advent of European economic integration, U.S. exports will face the problem of dealing with differing national technical standards. It is essential that the government, through NIST, accept a stronger role in support of U.S. standards and accreditation issues in negotiations with other governments.

AAES encourages a two-year budget reauthorization for the NIST. Long range planning is critical to meeting technological and competitive challenges facing the U.S. AAES urges your support for NIST and its programs. Strong leadership in technology policy and support for NIST are necessary to ensure continued U.S. competitiveness. Appropriate funding levels are essential for NIST to achieve its mission and continue its important role in supporting the nation's science and technology base.

AAES applauded the creation of the Office of Under Secretary of Commerce for Technology. We encourage further development and implementation of a national technology policy that focuses responsibility within the federal government. There must be a centralized authority to promote technology development, conduct impact assessment of proposed regulations on the nation's economic competitiveness, and coordinate and support research and development efforts. Such authority should be located at the cabinet level.

Thank you for the opportunity to present the views of the American Association of Engineering Societies on the reauthorization of the National Institute of Standards and Technology.

Geraldine V. Cox, Ph.D.

Dr. Geraldine V. Cox is Vice President and Technical Director of the Chemical Manufacturers Association (CMA). CMA is a nonprofit trade association whose company members represent more than 90 percent of the productive capacity of basic industrial chemicals in this country. Dr. Cox holds a Ph.D. and Master's in Environmental Science, and a Bachelor's degree in Biology from Drexel University, Pennsylvania.

Dr. Cox directs technical activities for the chemical industry association which include: occupational health and safety, risk assessment and management, toxic substances regulations, environmental programs, transportation, and biomedical and environmental special research programs. Her duties include supervision of the Chemical Self-funded Technical Advocacy and Research (CHEMSTAR) and the Environmental Divisions. She also directs management of the National Chemical Response and Information Center (NCRIC) which provides the public information, training and assistance with chemical emergencies. The Center includes CHEMTREC (a 24-hour-a-day emergency response network for hazardous chemical spills).

Dr. Cox serves on: the U.S. Coast Guard Chemical Transportation Advisory Committee, and is chairman of the Marine Occupational Safety and Health Subcommittee; the American Chemical Society's Board Committee on Environmental Improvement and the Committee on Science; the industry-wide Global Climate Coalition, the Global Climate Coalition Steering Committee, and chairs the Global Climate Research Subcommittee. She is a member of the National Association of Manufacturers Environment Committee. She is chairman of the Engineering Affairs Committee of the Association of American Engineering Societies. She chaired the U.S. Delegation to the World Conference on Hazardous Waste for the Water Pollution Control Federation. Dr. Cox was president of the Federation of Organizations for Professional Women; was co-chair of the Conservation Foundation's Dialogue Group on Hazardous Waste Siting; served on the Hazardous Materials Advisory Council's Board of Directors, and the Committee on Environment of the U. S. Chamber of Commerce.

Dr. Cox was selected as a White House Fellow in 1976, was one of Ten Outstanding Young Women in America in 1975, received the Society of Women Engineers' Achievement Award in 1984, and Drexel University's Engineering and Science Award in 1987.

Mr. VALENTINE. Thank you, Doctor Cox.

Doctor Marsten.

STATEMENT OF RICHARD B. MARSTEN, VICE CHAIRMAN, IEEE-USA ENGINEERING R&D POLICY COMMITTEE, WASHINGTON, D.C.

Dr. MARSTEN. I am Doctor Richard B. Marsten. I appear before you, Mr. Chairman, and Committee Members, as vice chairman of the Institute of Electronic and Electrical Engineers, Engineering R&D Policy Committee. Professionally, I am executive vice president and chief operating officer of a new venture company, the International Radio Satellite Corporation.

The IEEE is the world's largest technical professional society, with nearly a quarter of a million members in the United States alone engaged in a broad and growing range of electro technologies. This gives the IEEE a special interest in U.S. Government programs which support the advance of technology and the Nation's competitive position.

NIST fills an essential role in supporting the Nation's science and technology base. As the unbiased arbiter of the many issues which the technical community faces relating to measurements, it performs a key and ever-growing function of Government for the country. As the variety and complexity of measurements expands with the growing wave of modern technology, a sound system of standard measurements is vital to research and development, productivity growth, assurance of quality, and, thus, a healthy posture for international trade.

Unfortunately, the NIST budget has not been adequate in recent years to deal with this vital mission. As the former National Bureau of Standards, it was historically burdened with additional tasks and underfunded to execute that basic role. Each new project brought an expanded mission and insufficient resources.

We are very happy with the Administration's stated commitment to double the NIST budget by 1996. However, given the experience with a similar commitment regarding the National Science Foundation, we're not inclined to accept an assumption that NIST's future budgets are assured. Thus, until the proposed budget increase for NIST is realized, the IEEE will continue to point out that there can be little doubt why the international competitive position of the United States continues to decline when the Federal Government still does not adequately support its own standards role, which, under the law, can belong to no other organization. This synergistic role is absolutely vital, although it will cost only a tiny fraction of the amount invested by industry and a tiny fraction of the overall Federal budget.

I pass now to the Advanced Technology Program. Last year, we expressed alarm that initiation of the Advanced Technology Program had resulted in a major expansion to the mission of NIST, again, not accompanied by an adequate funding increase. We support strongly the ATP's goal of encouraging cooperative efforts among industry, universities, and Government in technology development. Given adequate resources, ATP can and should play a vital national role in promoting technology. However, ATP should not be allowed to drain off resources essential to NIST's critical standards role.

In a recently released IEEE U.S. Activities Policy Statement on engineering R&D and technological competitiveness, appended to the testimony for the record, Mr. Chairman, we addressed the proper role of Government in funding pre-commercial engineering R&D activities to support the Government's stated position regarding technology competitiveness. We make two recommendations; one pointed directly at the NIST and the ATP. That one is: restructure technical activities within the Department of Commerce to provide a coordinated approach to achieving industrial competitiveness. In the same vein, in that policy statement, we say a foundation has been laid for this recommendation with the Advanced Technology Program in the National Institute of Standards and Technology.

We recommend strongly that the ATP be funded to evolve into a national civilian technology agency within the Department of Commerce, but carefully separated from the standards and measurements mission of NIST. The new agency should be empowered to fund all the elements of engineering activity necessary to regain our industrial competitive leadership with private sector risk-sharing increasing as the engineering elements come closer to commercial prototype model status.

The IEEE not only does not see progress in this direction but notes with great dismay that within the NIST budget request the ATP funding remains flat; there is no increase from fiscal year 1991. We consider this a strongly negative message with regard to the Government's real intentions concerning technological competitiveness. It portrays a position divorced from the reality of rapidly waning U.S. technological competitiveness. In line with the American Technology Preeminence Act, which I note is the "ATP" Act, the ATP budget should be $100 million in 1992 and should double again in fiscal year 1993. Providing no increase for the ATP undermines its entire purpose and fails to address support for the pre-commercial activities so essential to technological competitiveness.

Now, Mr. Chairman, I have two examples of good and bad things in the NIST budget proper. The first is in Computer Science and Technology Programs. NIST fills a small but essential role for information technology, a large and vital industry where U.S. world leadership has slipped badly in recent years. The fiscal year 1992 increase to $15 million is welcome but it only brings this function to the budget level it should have had in 1986 not corrected for inflation. In the intervening years, NIST has been assigned additional responsibility for computer security and has seen a huge growth in the area of integrated digital services network standards development. New funding for both of these areas is welcome but is woefully inadequate.

The U.S. information industry invests aggressively in technology development, but only the Government can fill a central role in standards development necessary to enable our economic powerhouse to perform. ISDN is a particularly compelling case. European technology providers are well along the path to interoperability while U.S. manufacturers lack clear standards and U.S. carriers feel constrained not to develop them in the post-AT&T divestiture environment.

NIST is performing a critical function in bringing U.S. industry together to reach consensus on ISDN standards. These standards also are likely to have a large impact on the proposed National Research and Education Network. To field the NREN in the projected period, we estimate that NIST will need additional ISDN funding growth from the $1.6 million requested in fiscal year 1992 to $5 million by fiscal year 1994.

And, now, finally, Mr. Chairman, the good news in electronics and electrical engineering, to end on a positive note. It is natural for the IEEE to pay special attention to the status of NIST's electronic and electrical engineering laboratory. We therefore note with enthusiasm the budget request for this laboratory shows sustained growth, including the doubling of budget authority from fiscal year 1990 to fiscal year 1992. The programs selected for fiscal year 1992 funding increases—magnetic measurement, superconductivity, microwave measurements, lightwave measurements, and semiconductor measurements—are all at the cutting edge of technological development. We're particularly gratified that our many years of calling for additional funding in microwave measurements have now been heeded. These programs represent the best tradition of Government filling an appropriate and necessary role that helps enable U.S. industrial competitiveness. Each of these initiatives is very highly leveraged in the commercial sector. For example, economic benefits and improved industrial productivity from the NIST program in lightwave measurement are expected to exceed $1 billion over ten years.

We are also pleased to note, in closing, that the recent reorganization of NIST has brought many of the laboratories closer to the institute's top management. Although it is impossible to please everyone when a major organizational change occurs, we understand this change reflects well on this management in that it not only reduces administrative overhead but has generally been very well received by the NIST population.

Thank you, Mr. Chairman.

[The prepared statement of Dr. Marsten follows:]

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TESTIMONY BY

DR. RICHARD B. MARSTEN
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ENGINEERING R&D POLICY COMMITTEE
INSTITUTE OF ELECTRICAL AND ELECTRONICS
ENGINEERS - UNITED STATES ACTIVITIES

Before The

SUBCOMMITTEE ON TECHNOLOGY & COMPETITIVENESS
OF THE HOUSE SCIENCE, SPACE & TECHNOLOGY COMMITTEE

On The

FY 1992 BUDGET REQUEST FOR THE
THE NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY

February 26, 1991

IEEE-USA, 1828 L Street, N.W. Suite 1202, Washington, DC 20036-5104
The Institute of Electrical and Electronics Engineers, Inc.

Testimony by Dr. Richard B. Marsten

on the

FY 1992 Budget of the National Institute of Standards and Technology

before the

Subcommittee on Technology and Competitiveness
House Science, Space & Technology Committee

February 26, 1991

I am pleased to testify this afternoon on behalf of the Institute of Electrical and Electronics Engineers - United States Activities (IEEE-USA) and its Engineering R&D Policy Committee on the Administration's FY 1992 budget request for the National Institute of Standards and Technology.

The growth and application of technology are particular interests of the IEEE. We are the world's largest technical professional society with nearly a quarter of a million members in the United States engaged in advancing the frontiers of knowledge and sustaining our technological competitiveness with a broad and growing range of electrotechnologies. This gives IEEE-USA a special interest in U.S. government programs which support the advance of technology and the nation's competitive position. We are therefore eager to address the elements of the proposed National Institute of Standards and Technology (NIST) budget that affect electrical and computer engineering science and technology, and to provide our perspective on the role of the Department of Commerce in fostering development of technology for the nation, thereby enhancing our global competitive position.

There can be no doubt that NIST fills an essential role in supporting the Nation's science and technology base. As the unbiased arbiter of the many issues which the technical community faces relating to measurements, it performs a key function of government for the country. Moreover, this is an ever-growing role, as the variety and complexity of measurements expands with the growing wave of modern technological society. A sound national and international system of standard measurements is vital to research and development, productivity growth, assurance of quality, and a health posture for international trade. The basic and applied research performed by NIST in support of measurements is absolutely vital in these areas.

Unfortunately, the NIST budget has not been adequate in recent years to deal with this vital mission. As the former National Bureau of Standards (NBS), it was historically underfunded to execute its basic role and burdened with additional tasks inspired by the high technical quality of its people and facilities. Each new project brought a small increment of funds, with a promise of out-year increases; in reality, the increases often failed to materialize and the Bureau was left with an expanded mission and insufficient resources. We are very happy with the Administration's stated commitment to double the NIST budget by 1996. However, given the experience with a similar commitment regarding the National Science Foundation, we are not inclined to reduce our efforts on behalf of NIST based on an assumption that its future budgets are assured.

Thus, until the proposed budget increase for NIST is realized, we will continue to point out that there can be little doubt why the international competitive position of the United States continues to decline when the Federal government still does not adequately support its own standards role, which, under the law, can belong to no other organization. This synergistic role is absolutely vital, although it will cost only a tiny fraction of the amount invested by industry, and a tiny fraction of the overall Federal budget.

ADVANCED TECHNOLOGY PROGRAM

Last year we expressed alarm that the initiation of the Advanced Technology Program (ATP) had resulted in a major expansion to the mission of NIST, again not accompanied by an adequate funding increase. We strongly support the ATP's goal of encouraging cooperative efforts among industry, universities, and government in technology development. Given adequate resources, ATP can, and should play a vital national role in promoting technology. However, ATP should not be allowed to drain off resources essential for NIST's critical standards role.

In a recently released IEEE-USA policy statement on Engineering R&D and Technological Competitiveness (which is appended for the record), we address the proper role of government in funding precommercial engineering R&D activities to support the government's stated position regarding technology competitiveness. We make two recommendations, one pointed directly at the NIST and the ATP. That is:

> Restructure technical activities within the Department of Commerce to provide a coordinated approach to achieving industrial competitiveness.
>
> A foundation has been laid for this recommendation with the Advanced Technology Program (ATP) in the National Institute of Standards and Technology (NIST). We recommend strongly that the ATP be funded to evolve into a national civilian technology agency within the Department of Commerce but carefully separated from the standards and measurements mission of NIST. The new agency should be empowered to fund all the elements of engineering activity necessary to regain our industrial competitive leadership, with private-sector risk-sharing increasing as the engineering elements come closer to commercial, prototype-model status.

The IEEE-USA not only does not see progress in this direction, but notes with great dismay that within the NIST budget request the ATP funding remains flat: there is no increase from FY 1991. We consider this a strongly negative message with regard to the government's real intentions concerning technological competitiveness. It portrays a position divorced from the reality of rapidly waning U.S. technological competitiveness. The ATP budget should be $100 million in FY 1992, and should double again in FY 1993. Providing no increase for the ATP undermines the entire purpose and fails to address support for the precommercial activities so essential to technological competitiveness.

COMPUTER SCIENCE AND TECHNOLOGY PROGRAMS

There is little we can say in this area that does not repeat our testimony of previous years. NIST fills a small but essential role for information technology, a large and vital industry where U.S. world leadership has slipped badly in recent years. The FY 1992 increase to $15 million is very welcome, but it only brings this function to the budget level it should have had in 1986, without accounting for inflation. In the intervening years, NIST has been assigned additional responsibility for computer security and has seen a huge growth in the area of Integrated Digital Services Network (ISDN) standards development. New funding for both of these areas is welcome, but is woefully inadequate. The U.S. information industry invests aggressively in technology development, but only the government can fill a central role in standards development necessary to enable our economic powerhouse to perform.

ISDN is a particularly compelling case. European technology providers are well along the path to interoperability, while U.S. manufacturers lack clear standards and U.S. carriers feel constrained not to develop them in the post-AT&T divestiture environment. NIST is performing a critical function in bringing U.S. industry together to reach consensus on ISDN standards. These standards also are likely to have a large impact on the proposed National Research and Education Network (NREN). To field the NREN in the projected period, we estimate that NIST will need additional ISDN funding growth from the $1.6 million requested in FY 1992 to $5 million by FY 1994.

ELECTRONICS AND ELECTRICAL ENGINEERING

To end on a positive note: it is natural for the IEEE-USA to pay special attention to the status of NIST's Electronics and Electrical Engineering Laboratory. We therefore note with enthusiasm that budget requests for this laboratory show sustained growth, including a doubling of budget authority from FY 1990 to FY 1992.

The programs selected for FY 1992 funding increases--magnetic measurement, superconductivity, microwave measurements, lightwave measurements, and semiconductor measurements--are all at the cutting edge of technological development. We are particularly gratified that our many years of calling for additional funding in microwave measurements have been heeded. These programs represent the best tradition of government filling an appropriate and necessary role that enables U.S. industrial competitiveness.

Each of these initiatives is very highly leveraged in the commercial sector--for example, economic benefits in improved industrial productivity from the NIST program in lightwave measurement are expected to exceed $1 billion over 10 years.

We are also pleased to note that the recent reorganization of NIST has brought many of the laboratories closer to the Institute's top management. Although it is impossible to please everyone when a major organizational change occurs, we understand this change reflects well on NIST management in that it reduces administrative overhead.

ENTITY POSITION STATEMENT

ENGINEERING R&D AND TECHNOLOGICAL COMPETITIVENESS

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A steady decline has taken place during the past thirty years in the secure positions of superior technological competitiveness and world industrial leadership once enjoyed by the United States. We hold that one important factor in this decline has been a deficiency in U.S. funding of engineering research and development (R&D).

It is essential to distinguish between engineering and science with regard to R&D; both are important, and they must be balanced and integrated for maximum effectiveness. U.S. engineering R&D investments have declined relative to our competitors while U.S. support for basic science research has increased. To help regain our former leadership position, the government must support generic precompetitive engineering R&D and provide partial support for the early, precommercial development phases that have no equivalent in science. In these developmental stages, the leading responsibility falls increasingly to industry as engineering R&D moves ever closer to true commercialization.

RECOMMENDATIONS

1. A stronger voice at the Cabinet level for engineering and technology.

We recommend redesignation of the Department of Commerce to include technology explictly, say, as a Department of Industry and Technology or a Department of Technology and Trade. Establishing an Undersecretary for Technology in the Department of Commerce has created a foundation of real strength to support this recommendation. Also, because economic strength derived from advanced technology is a fundamental requirement for national security today, the Secretary should be a member of the National Security Council.

2. Restructuring technical activities within the Department of Commerce to provide a coordinated approach to achieving industrial competitiveness.

A foundation has been laid for this recommendation with the Advanced Technology Program (ATP) in the National Institute of Standards and Technology (NIST). We recommend strongly that the ATP be funded to evolve into a national civilian technology agency within the Department of Commerce but carefully separated from the standards and measurements mission of NIST. The new agency should be empowered to fund all of the elements of engineering activity necessary to regain our industrial competitive leadership, with private-sector risk-sharing increasing as the engineering elements come closer to commercial, prototype-model status.

United States Activities Board	February 4, 1991
Approving Entity	Date

DISCUSSION

NATIONAL TECHNOLOGICAL COMPETITIVENESS

Thirty years ago the United States enjoyed a secure technological position and superior industrial competitiveness in the world. Since that time, notwithstanding the funding of scientific research and a wealth of U.S. accomplishments in science, key industrial segments have been lost because of competition from other countries. The automobile, steel, textile, shoe and consumer electronics industries are examples where dominant U.S. positions have been lost to international competition. Both the semiconductor and integrated circuits industry and the telecommunications equipment industry have recently fallen into jeopardy. Many other industries are threatened with eroding home markets and have great difficulty competing abroad. We hold that one factor in this decline has been a deficiency in U.S. funding of engineering R&D.

Our country's deteriorating position in international markets has been caused by a combination of factors. Important among these has been a de-emphasis of engineering R&D in the United States and accentuation of and focus on it by our competitors. A recent Department of Commerce Technology Administration assessment of the U.S. competitive position in 12 emerging technologies vis-a-vis Japan and Europe finds the United States gaining in none, holding in only two, and losing or losing badly in the rest. Short-range goals emphasized by industry have directed our attention away from adequate emphasis and support of engineering R&D.

PRECOMMERCIAL TECHNOLOGIES AND APPLICATIONS

While successful development of advanced generic precompetitive technology is a necessary element in the overall process of bringing technological innovation to commercial fruition, much more is required. The gap between generic R&D and commercial fruition includes applied research, advanced development, design and construction, manufacturing process technology development, and testing--a gamut of engineering elements with no scientific equivalents. These elements are essential parts of the process of getting from generic precompetitive R&D to a reliable prototype model of a commercial product or service. They represent the early precommercial phases of engineering R&D.

COMMERCIAL PHASES AND INDUSTRIAL MOTIVATION

Beyond these phases, product design, manufacturing development and final product manufacturing are required to bring new products or processes to market. U.S. industry must bear total responsibility for conducting these activities, as well as marketing. Thus, bringing new products or processes to market based on significant technological advances is a risky undertaking, usually with the prospect of long-term rather than near-term payoff. In today's economic climate, U.S. industry is frequently reluctant to initiate this kind of risk or cannot afford to do so. Although it is undeniably true that commercial decisions are best left in the hands of industry, a mechanism is needed to motivate industry to engage in such high-risk activity. Partial government support of the early precommercial phases would bridge the gap in the technology development process.

ENGINEERING R&D

The objective of scientific research is to add to the body of knowledge of natural phenomena, regardless of whether such additions to that knowledge have commercial application. Searches for fundamental particles of matter or new celestial bodies are examples. Such research may or may not fuel the economic engine, but in either case the time scale for results is generally very long.

Engineering research, in contrast, has an application objective. Again, the time scale may be long, but it is generally shorter than for scientific research. Engineering research may or may not be focused on an immediate product or service, but in any case it is directed toward the application of experimental and analytical results to public or industrial needs. Examples of engineering research include determining architectural, software, or systems characteristics for advanced, high-performance computing sytems, determining the manufacturing process techologies and packaging for the very large scale integrated circuit (VLSI) semiconductor chips required for supercomputer development and construction, or developing advanced materials for electric power generation.

It is important to note that engineering research may actually precede the scientific understanding of the underlying phenomena. Steam power, for example, was explored and put into practice well before thermodynamics was understood. More recently, there has been much research to create new superconducting materials, with applications as well as knowledge in mind, well before the physics of high temperature superconduction is understood.

Thus, it is not correct to assume that engineering research simply follows scientific understanding. Neither engineering nor science, neither scientific research nor application, always comes first. These activities complement each other; either can precede the other and both are essential to the continued technological and industrial growth of the United States. To reverse the de-emphasis of engineering research for industrial competitiveness, government funding of precommercial engineering R&D is needed on a scale commensurate with the technological and competitive ambitions of the United States. The required scale is on a par with that of funding for scientific research.

CONCLUSIONS

The fundamental role of engineering R&D in facing the international challenge of technological competitiveness must be better recognized. As technological developments move closer to commercialization the lead falls increasingly to industry, but government must play essential roles in the overall process of regaining a leading, industrially competitive position for the United States. Principal among these are:

- o Direct support of generic precompetitive engineering research and development;
- o Partial government support of early, precommercial phases of engineering R&D, which have no equivalents in science, for the purpose of sharing the risks of engineering R&D elements in the technology development process on the way to marketable products and services;

- Encouragement and facilitation of industrial activity in developing competitive technologies and their applications to marketable products; and,
- Aid to engineering and science education to ensure the future presence of an imaginative, productive, engineering profession.

Government also needs to take a stronger role in transferring technologies from government laboratories to industry.

IEEE-USA encourages and supports government initiatives fulfilling these roles. We recommend two initiatives we consider fundamental: (1) a stronger voice for engineering and technology at the Cabinet level; and, (2) restructuring technical activities within the Department of Commerce to provide a coordinated approach to achieving industrial competitiveness. In both initiatives, the government has already laid foundations. It is essential to our continued national economic strength to take these additional steps.

DR. RICHARD B. MARSTEN

Dr. Richard B. Marsten is an electronics and spacecraft systems engineer who has held engineering executive positions in industry, government, and university organizations.

He currently serves as Executive Vice President and Chief Operating Officer of International Radio Satellite Corporation. He was Chief Engineer of RCA's AstroElectronics Division, directing a department of 1000 people in the design and construction of spacecraft; Director of (Satellite) Communications Programs at NASA Headquarters, where he ran programs having a composite budget of about $70M (1972) in satellite communications and broadcasting; and Dean of the School of Engineering at the City University of New York.

He chaired the Telecommunications Advisory Committee for the Office of Technology Assessment of the U.S. Congress, and was Executive Director of the National Academy of Science's Board on Telecommunications and Computer Applications. Among the Board's studies which he directed were a series on national security telecommunications and two on modernization of the Voice of America's broadcast transmission facilities, including application of satellite broadcasting techniques to supplement, eventually, the installed shortwave plant.

He is a Fellow of the IEEE, current Vice Chairman of the IEEE-USA Engineering R&D Policy Committee and a member of the IEEE-USA Aerospace R&D Policy Committees. In addition, Dr. Marsten was founding chairman of the IEEE-USA Committee on Communications and Information Policy, past member of the Boards of Governors of AESS and Comsac, and past Vice President, Technical Activities, of AESS. He holds the NASA Exceptional Service Medal and the Apollo-Soyuz Space Medal. He received a White House Commendation for a study of communications for social needs, applying satellite communications and broadcasting technologies to such social activities as education, health care, and electronic delivery of mail by satellite, for the President's Domestic Council.

Dr. Marsten holds B.S. and M.S. degrees in electrical engineering from M.I.T. and a Ph.D degree in engineering physics from the University of Pennsylvania, and is a licensed Professional Engineer.

Mr. VALENTINE. Thank you, Doctor.

We thank all of you very much. I have a number of questions. Owing to the hour, we will take the liberty of submitting them to you and ask for you to give us a little more of your time and attention.

[The prepared questions submitted by Mr. Valentine follow:]

RELIANCE ELECTRIC

JOHN C. MORLEY
President
Chief Executive Officer

March 15, 1991

The Honorable Tim Valentine, Chairman
Subcommittee on Technology and Competitiveness
U. S. House of Representatives
Committee on Science, Space and Technology
Suite 2320 Rayburn House Office Building
Washington, DC 20515

Dear Mr. Chairman:

I am pleased to submit the enclosed responses to the questions received from the Subcommittee following my testimony on February 26, 1991 at the Department of Commerce Technology Administration Fiscal Year 1992 Authorization hearing.

Sincerely,

John C. Morley

JCM/jm

Enclosures

cc: K. McLennan, MAPI
W. Grimberg, Cleveland Tomorrow
E. Kwiatkowski, CAMP
G. Sutherland, GLMTC
S. Stone, Subcommittee Staff ✓

6065 Parkland Boulevard
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# RESPONSES TO QUESTIONS FROM SUBCOMMITTEE
FROM J. C. MORLEY

1. Your testimony makes the point that manufacturing to metric standards is necessary to compete in export markets, yet there is still resistance on the part of some U.S. industry to converting to the metric system. What recommendations do you have to increase acceptance of the metric system.

   ANSWER. First, I believe there needs to be a better understanding and acceptance on the part of U.S. manufacturing of the importance of global standards to the overall competitiveness of United States industry. If we are to compete globally, U.S. industry must be able to manufacture to global standards.

   Second, we need to increase our efforts in educating the public in the use of metric and its importance in our overall economic health. Along with that, the public needs to see greater visibility of government and private sector efforts in their everyday lives in the use of metrics to better orient them to the transition, i.e., road signs, food packaging and other consumer oriented items.

   Third, government can help by providing assistance and incentives to industry to help with the cost of conversion and the adaptation of metric standards.

2. Your testimony points out that the U.S. is the only major industrial country which is not on the metric system. To what extent has Reliance Electric gone metric? Is Reliance Electric likely to manufacture entirely to metric standards? How is your company hurt by the country not being more on a metric standard?

   ANSWER. Reliance has adapted metric where we are not currently prohibited by an applicable industry standard such as NEMA. We currently have metric products available in DC motors, some AC motors, and some mechanical power transmission products. Reliance would like to switch to metric standards and it would be our objective to switch at the point in time industry standards would allow us. The lack of metric standards hurts our global competitive efforts as we attempt to compete in those markets. In addition we have to absorb the cost associated with dual standards. This shows up in development cost, inventory costs and the cost of applying these products to our customer's needs.

3. You indicated that the Cleveland Advanced Manufacturing Program had provided small and medium-size businesses with technical assistance which had a big payoff. Can you give a specific example of this assistance and illustrate why it was so successful?

   ANSWER. Let me site an example where the Great Lakes MTC worked with a Youngstown company to analyze their plant operations for the purpose of making recommendations to address their most urgent manufacturing problems. Implementation of these recommendations resulted in a $4.1 million savings in inventory, a 5% reduction in material cost, and a 13% increase in labor productivity which resulted in a $630,000 cost savings. In addition, on time delivery performance was achieved and the company was able to increase their sales by 10%. We have another recent example where a company was able to adapt sensor technology developed in the Sandia Federal Labs in New Mexico and incorporate that technology in a product within three months.

I would like to introduce a copy of the 1990 Annual Report for the Great Lakes Manufacturing Technology Center for the record. This report outlines some of the very successful programs being carried out by the center and gives additional examples of success (copies enclosed).

Do you consider it to be a problem that the program works with a very small percentage of Ohio manufacturers?

The center has already made contact with almost half of the 6000 small and medium sized companies in the area including a significant number of plant visit site assessments. This is in addition to the number of indepth programs undertaken. The center is currently contacting companies at a rate of 40 per week, conducting about 6 new site plant visits per week and participating in technology transfers at a rate of 19 per week. I do not consider this a small number or a problem. In fact, considering the duration of the program, I am very pleased with the tremendous success of the program.

4. You recommend that funds be appropriated to speed up the establishment of more Regional Manufacturing Centers.

What features of the Cleveland Advanced Manufacturing Technology Center would you replicate at the new centers?

What potential pitfalls would you identify and recommend that the new centers avoid?

ANSWER. I am very anxious to see more regional manufacturing centers established. We must share the lessons learned in our existing centers and duplicate these field tested methods across the United States to realize the impact of the high payoffs experienced by the Great Lakes Manufacturing Technology Center. As you consider establishing new centers, I believe that some of the reasons for success have included a strong partnership of industry, colleges and universities, along with federal, state and local governments. These partnerships create a tremendous base for networking amongst the participants and provide access to the valuable resources available. Secondly, the program needs experienced, qualified and credible people to staff the center. Third, the center needs to keep its client focus and constantly work on its communication effort with the participants. We have found that word-of-mouth success stories have been our most effective means of describing our capabilities.

I would encourage any new center to remain very focused with specific objectives. Don't attempt to be too broad in your program and don't lose perspective of industries' needs in developing your products and services. You also need to work hard to leverage all of your resources and recognize the extensive effort and time required to develop the trust and nurture small companies to establish your credibility.

5. Federal support for the Regional Manufacturing Technology Centers is scheduled to be phased out gradually and end completely in 1994. Since this program has proven to be a success in helping smaller manufacturing companies to adopt existing technologies and improvements in their manufacturing processes, would you recommend that the program be extended subject to periodic independent evaluation of the program's performance. How much more time is required before a phase-down of federal funding will be less harmful? What type of satellite activities would be necessary to reach towns like Youngstown or Toledo?

ANSWER. I have no problem with the concept of periodic independent evaluation of the program's performance, however, I believe it is a mistake to consider phasing down federal funding of these centers. Our government needs to be competitive with other countries who provide active government participation. It gets back to the global competitiveness issue and the importance of this type of industry/government partnership to our national economy. Government needs to recognize the permanence of this partnership and anticipate providing long term funding assistance.

The Great Lakes Manufacturing Technology Center is an excellent example of industry and government partnership. Our government needs to recognize their role in this partnership. That this question is being asked suggests a lack of understanding of the importance of government's role in maintaining our competitiveness.

In an effort to reach more communities, the center has established a pro-active outreach program utilizing technology application engineers to support businesses in other communities within a broader region. We have already completed successful programs in cities like Youngstown.

6. The original charter of the Technology Administration called for the establishment of two manufacturing centers a year for six years for a total of twelve centers. Three years into the program, the establishment of the fourth and fifth center is just beginning. Do you consider the Administration's proposed FY 1991 budget for these outreach programs adequate?

ANSWER. I believe the proposed funding is not adequate to expand the number of regional centers as originally planned and at the same time maintain funding levels for the existing centers. We have demonstrated that the centers have produced many successful programs with a significant economic impact. In light of our global competitiveness objectives, funding levels should be increased to support both existing centers and expansion.

7. It is clear that a high level of productivity is critical to the competitive position of a company or an industry.

Have the Japanese surpassed U.S. industry and, if so, when and how did they do it?

How important is capital investment in the productivity race?

How does the rate of capital investment in Japan compare with the U.S. investment performance?

ANSWER. In many industries I believe that Japan has passed the U.S. within the past decade. Japan has had a higher rate of capital investment than the United States and they have adopted product and process technologies faster. I would also observe that they have had a better focus on quality which impacts productivity and they have utilized manufacturing concepts that have significantly improved productivity.

Capital investment is important in the productivity race, but I would point out that it is one of a number of issues to address when trying to improve productivity. Quality, technology, manufacturing concepts and employee empowerment also impact productivity.

If you look at Japan's investment in capital in 1989, you will find that they invested more in absolute dollars in plant and equipment than did the United States. Yet there manufacturing sector produces only about 60% of the output of U.S. manufacturing.

8. Members of the Science Committee plan to reintroduce the American Technology Preeminence Act in the near future. What changes, if any, do you propose be made to the legislation?

ANSWER. I would suggest that the Bill contain language which specifically allows a MTC which passes the third year review, to receive an amount no less than $3 million in FY 1992 with no change in the 50/50 federal, non-federal match requirement.

Minimum appropriations for the MTC program for FY 1991 should be sufficient to fund the three existing centers at $3 million each per year, two new centers at $1.5 million each and the appropriate administrative cost for NIST.

Minimum appropriations for the MTC program for FY 1992 should be sufficient to fund the three existing centers at $3 million each (assuming all pass the review), $3 million for each of the two new centers, $1.5 million for start up of the sixth center and the appropriate administrative costs for NIST.

I feel very strongly that the MTC program should continue and be expanded with no reduction in federal funding. Accordingly, I would suggest the Committee report indicate that the Committee is prepared to consider expanding the regional MTC program and the level of federal funding for the MTCs that perform well, in the next round of reauthorization.

UNITED
TECHNOLOGIES
RESEARCH
CENTER

East Hartford
Connecticut 06108

March 25, 1991

The Honorable Tim Valentine
House Subcommittee on
 Technology and Competitiveness
Suite 2320 Rayburn House Office Building
Washington, DC   20515

Dear Mr. Valentine,

I am enclosing my response to the eight questions which were asked as a result of my testimony on February 26th concerning the Department of Commerce Technology Administration Authorization for FY 1992.

My response has been delayed because I have circulated the questions among my peers in other major corporations to insure that my response is representative of industry as a whole.

Thank you for this opportunity to provide feedback on the National Technical Information Service.

Sincerely,

Jean G Mayhew

Jean G. Mayhew
Manager, United Technologies
Library & Information Services

NTIS QUESTIONS

1. **NTIS is responsible for maintaining the Federal Research-In-Progress (FEDRIP) database, which is incomplete because the Federal agencies do not provide NTIS with documentation on their research. Do you have any recommendations how NTIS can keep this database complete and up-to-date?**

   Congress can enhance the importance of FEDRIP by requiring that the number of research projects added to the database by the agency be included as part of the agency's report to Congress. Agency management will be motivated to cooperate with NTIS if they think that Congress is paying attention.

   Another concept would be to base financial support of research projects on the registration of the project with NTIS. No ready access to the documentation on the project would mean no financial support. This idea may seem extreme, but how can Congress be sure that it is not financing redundant research if it is not even sure what research is going on?

   A directive to the agencies or legislation mandating cooperation with NTIS would also improve the situation.

2. **What mechanisms need to be put in place to insure complete coverage of today's federal and scientific technical information?**

   The answer to this question is the same as to question # 1. Directives can be issued. Congress can legislate. But the cost is minimal if Congress starts asking the right questions when federal agencies report on their activities or ask for financial support.

   The questions may be as simple as: How many research projects did you add to the FEDRIP database? Does this figure include all research pending? If not, why not? How many documents were deposited with NTIS? Does this figure include all scientific and technical documentation? If not, why not?

3. **In your testimony you mentioned that you have problems identifying and procuring historical federal scientific and technical information. What are your suggestions for making this historical information more available to you?**

NTIS must become known not only as a collector of current information but also as a repository for historical data. For example, when a federal scientist clears out his office prior to retirement, boxes of his documentation should be shipped to NTIS rather than discarded. Industry fills in many collection gaps using this method.

The Library of Congress should turn over its historical technical report files to NTIS. NTIS is more efficient in processing documentation and making it readily available to the public.

NTIS should receive special funding to add historical documents to the NTIS Database. NTIS does not include in its database the thousands of documents which it has on file from the 1940's, 1950's and early 1960's. An old-fashioned card catalog exists for these documents within NTIS but the customer has no access to the file.

4. **As a user of the National Technical Information Service (NTIS), has United Technologies experienced any difficulties with obtaining services?**

United Technologies has not had any recent problems in obtaining services from NTIS.

Problems reported to me by librarians in other corporations include inaccurate invoices and incorrect pricing of documents. It is hoped that an automated accounting system would clear up these problems.

5. **If NTIS is not able to modernize its products and services, what would be some of the negative consequences to a company like United Technologies?**

NTIS will be out of synch with industry objectives. Industry is striving towards the electronic delivery of all documentation to the engineer's workstation. However, the Inspector General has instructed NTIS not to pursue full-text electronic delivery of documents. Industry will not be able to deliver federal scientific and technical documentation electronically to an engineer's workstation if NTIS does not modernize.

NTIS can not be cost effective without modernization. The volume of information being produced by the federal government requires modernization to produce cost effective services.

6. **Could you comment on the value of NTIS' international efforts to companies such as United Technologies?**

NTIS is in a unique position to gain access to foreign documentation. As part of the Department of Commerce, NTIS can draw on relationships already established by the federal government to acquire foreign scientific and technical information. Industry could not easily duplicate the foreign alliances established by NTIS.

Foreign governments can use NTIS as a central resource to distribute information throughout the U.S. NTIS makes it easy for foreign governments to provide broad-based distribution of their information. A specific example is the Conference on Japanese Scientific and Technical Information which is co-sponsored by NTIS and the Japan Information Center of Science and Technology (JICST) which will be held in Washington on April 2, 1991.

NTIS can make translations of scientific and technical information generally available. Numerous individuals benefit when a translated document is available from NTIS, in contrast to having a single company pay for a translation. Unfortunately NTIS is curtailing this activity due to limitations in funding.

7. **NTIS is in the process of modernizing its facilities. Do you have any recommendations for what needs to be done? In your opinion, what would an ideal NTIS operation?**

NTIS should focus on two areas of modernization: internal operations and document delivery. Internal operations includes the accounting system, internal document tracking service, electronic receipt of documents from other federal agencies, etc. Improved document delivery would include the electronic delivery of materials; any other customer needs could be fulfilled using this technology as a baseline.

The ideal NTIS would be a seamless electronic service. A customer would be able to search the electronic database to identify documents on the appropriate subject. From the database the customer would be able to determine the price and availability of the materials as well as place an order. Options on placing the order would be to: 1. view the entire document on the screen; 2. have it faxed immediately; 3. request a paper document for overnight delivery or through the mail.

NTIS would also provide the option of creating a cd/rom which would include the full text of documents specified by the customer.

All bills for services could be received and paid electronically.

The ideal NTIS would require financial support beyond revenues generated from sales. For 45 years, NTIS has been financially self-supporting. This concept is no longer practical. Product prices that could support modernization will inhibit the flow of information nationally. Small companies can not afford documents which have been priced to recover modernization costs. Larger companies will cut back the number of documents ordered due to budget restraints.

8. **In your opinion, is NTIS sufficiently focused, or does NTIS need a clearer definition of the types of scientific and technical information it should acquire in order to better serve its customers?**

A focused NTIS would result in limited access to federal scientific and technical information. Think back 30 years. Could anyone have predicted the technologies which have been critical to our success as a nation? If NTIS becomes focused, for example, on OSTP-defined critical technologies, areas of peripheral interest will suffer. And one of those peripheral areas could be the foundation of a critical technology for the year 2010.

The 'focus' should be placed on improving cooperation between NTIS and other federal agencies. Preserving our technical heritage as a base for future competitiveness is a priority.

IEEE

UNITED STATES ACTIVITIES

Promoting Career and Technology Policy Interests of Electrical, Electronics & Computer Engineers

United States Activities Board

Technology Policy Council
Aerospace R&D Policy
Communications &
Information Policy
Defense R&D Policy
Energy Policy
Engineering R&D Policy
Health Care Engineering Policy
Man & Radiation

Government Activities Council
Congressional Fellows
Washington Internship for
Students of Engineering
Legislative Report
National Government Activities
State Government Activities
Technology Policy Conference
Technology Transfer
U.S. Competitiveness

Member Activities Council
Awards & Recognition
Communications
Continuing Engineering Education
Employment Assistance
IMPACT
Opinion Survey
Precollege Education
Professional Perspective
Salary Survey

Professional Activities Council
for Engineers (PACE)
PACE Regional & Divisional Activities
PACE Information/Workshop
Student Professional Awareness

Career Activities Council
Anti-Discrimination
Career Maintenance & Development
Ethics
Intellectual Property
Licensure & Registration
Manpower
Pensions

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March 27, 1991

The Honorable Tim Valentine
Chairman
Subcommittee on Technology and Competitiveness
Committee on Science, Space, and Technology
U.S. House of Representatives
Washington, DC 20515

Dear Congressman Valentine:

As a follow-up to my testimony of February 26, 1991 before the subcommittee on the Administration's FY 1992 budget request for the National Institute of Standards and Technology, I am pleased to provide IEEE-USA's views on the following written questions posed by you for submission to the hearing record.

1. How has a deficiency in U.S. funding of engineering R&D contributed to the decline of U.S. industrial competitiveness; how can the Federal Government play a role in regaining its superior position; and what role can engineering R&D play in facing the international challenge of technological competitiveness?

The IEEE-USA believes that industry's reluctance to invest limited capital resources into "risky" engineering research and development efforts without the promise of short term paybacks has significantly slowed the potential advance of technology and its commercialization. At the same time, our competitors have put increasing emphasis on the development and commercialization of technology with predictable consequences for U.S. competitiveness.

Although it is undeniably true that commercial decisions are best left in the hands of industry, the IEEE-USA believes that government must play a key role in enabling and encouraging industry to engage in such high-risk activity. Accordingly, we support a full range of initiatives including permanent extension of the Research and Experimentation Tax Credit, incentives for personal savings, etc., which are designed to promote long-term industry perspectives. As a significant source of R&D funding, however, the Federal government must also play an important role in supporting the precommercial phases of technology development. Investment in engineering R&D, including the precommercial phases of technology development it does not now support, would put proper focus of government efforts on the development of specific enabling technologies essential to sustaining the technological competitiveness of U.S. industry and helps to bridge the gap between basic research and commercialization of new products and services.

IEEE-USA, 1828 L Street, N.W. Suite 1202, Washington, DC 20036-5104

The Institute of Electrical and Electronics Engineers, Inc.

2. One of the recommendations in your statement is that engineering and technology have a stronger voice at the Cabinet level. What measures should be taken to achieve that, and how can the Advanced Technology Program play a part.

In the past, the IEEE-USA has endorsed various legislative efforts designed to provide a strong voice for engineering and technology at the cabinet level including proposals for a new Department of Science and Technology and reorganization of the Department of Commerce as a Department of Trade and Technology. We recognize inherent difficulties in achieving an organizational reform of this nature. Accordingly, we have focused our efforts in recent years to promoting a stronger voice for the President's Science Advisor and an expanded role for the Department of Commerce. In that regard, we applaud the establishment of a Technology Administration within the Department of Commerce and urge that Congress and the Executive continue to enhance and expand Commerce's role in this area. One way to promote such a role and voice at the cabinet level is to incorporate the word "technology" explicitly into that Department's designation. Another, an equally important action, would be to include the Secretary of Commerce as a member of the National Security Council insofar as national security today includes economic security.

The Advanced Technology Program (ATP) represents an important program focus for engineering and technology within the Department of Commerce. An adequately funded and successful ATP will strengthen the Secretary of Commerce's voice on technology issues at the cabinet level. We have recommended that the ATP be funded to evolve into a national civilian technology agency within the Department of Commerce but carefully separated from the standards and measurements missions of the National Institute of Standards and Technology. We believe that ATP funding levels contemplated in the American Technology Preeminence Act will help enable such an evolution and reiterate our position that the 1992 funding level must be increased to $100 million to avoid a strongly negative message from the government on technological competitiveness.

3. You also recommend in your statement that the Federal Government take a stronger role in transferring technologies from the Federal Laboratories to industry. What do you propose be done to achieve this?

The IEEE-USA strongly supports legislation currently in place to enable and provide incentives for technology transfer of federally-funded research. While we support the Administration's efforts to implement this legislation fully, we believe that much more can be done both in terms of improving attitudes and accessibility and in communicating opportunities for cooperative research to industry and academia. Executive direction from the highest level is essential to ensure that technology transfer becomes an integral part of all federal R&D planning, budgeting and program execution. That process would be strengthened by expanding opportunities for private sector input.

We also believe that Congress can provide an additional incentive for technology transfer at the Federal laboratories by passing legislation to extend copyright protection to software developed within the context of federally-funded cooperative research agreements.

4. In recent years, there have been substantial increases in Federal funding of basic research; however, applied research has not been that fortunate. In your opinion, what should be the balance between the two?

The IEEE-USA is concerned that U.S. investment in engineering R&D has declined relative to our competitors while at the same time support for basic science research has increased. While we support the national investment in basic scientific research, we believe that engineering and science must be balanced and integrated for maximum effectiveness. Therefore, we advocate funding of precommercial engineering R&D, including applied research, advanced development, design and construction, manufacturing process technology development, and testing, on a scale commensurate with that of current funding for scientific research.

5. Members of the Science Committee plan to reintroduce the American Technology Preeminence Act in the near future. What changes, if any, do you propose be made to the legislation?

The IEEE-USA supported passage of the American Technology Preeminence Act in 1990 as an important and reasonably balanced package of congressional initiatives designed to promote U.S. technological competitiveness. Within that package, we focused our support on authorizations for the Department of Commerce's Technology Administration including expansion of the Advanced Technology Program within NIST. Thus we will continue to support the "ATP" Act when reintroduced and will examine closely any proposals for new initiatives or changes. While we recognize the desirability from a congressional perspective of developing comprehensive legislation on science and technology issues, we urge the subcommittee and Congress to proceed with due haste to pass this much needed legislation.

6. If NIST's budget is doubled over 5 years, what areas would you recommend for further increase?

As indicated in our testimony, IEEE-USA strongly supports the NIST Advanced Technology Program and its mission of focusing federal investment in precommercial technologies so as to advance U.S. technological competitiveness. To have a real impact, funding for the ATP should increase at levels consistent with those originally outlined in the American Technology Preeminence Act. At the same, time, however, we are concerned that funding support of ATP should not detract from the essential standards and measurements mission of NIST.

As a society of electrical and electronics engineers, we also take particular note of NIST programs in computer science and electronics and electrical engineering. Like many of NIST's program areas, these particular programs have been asked to expand their efforts and mission in the past several years without accompanying increases in resources. For example, a significant increase in the FY 1992 request for information technology (up to $15 million) only brings that program to funding levels requested in 1986 uncorrected for inflation. We, therefore, recommend increases in the computer systems area particularly with regard to digital networking and computer security standards.

In conclusion, I would like to again thank the Subcommittee on Technology and Competitiveness for this opportunity to expand on our views regarding the importance of engineering R&D for U.S. technological competitiveness and the critical role played by the National Institute of Standards and Technology. We applaud Congressman George Brown for his vision in establishing the subcommittee and commend you for your leadership as its new chairman. The IEEE-USA stands ready to assist you as a resource for technical information and policy perspectives on critical U.S. technology and competitiveness issues.

Sincerely,

Richard Marsten/cg

Dr. Richard B. Marsten
Vice Chairman
Engineering Research &
Development Policy Committee

Mr. **Valentine**. Mr. Ritter?

Mr. **Ritter**. Thanks, Mr. Chairman. I really don't have many questions, but I did want to commend IEEE for the leadership role within the different engineering societies to get a handle on the competitiveness issue and to really put their money where their mouth was; to put together the kind of panels and discussion groups over the years, and do the kind of writing and research that really I think put IEEE almost at the head of the class when it came to evaluating the state of America's competitiveness in the electronics business.

Dr. **Marsten**. Thank you, Mr. Ritter.

Mr. **Ritter**. Good work.

And Geraldine Cox, Doctor Cox, I want to commend AAES for seeking to put a greater voice of the engineering community forward and to get this very important American constituency out front on these critical issues as opposed to bringing up the rear in a post facto way after the bills are through and the debates are over. You have some great programs out at AAES. There is a precollege math and science program involving 41 engineering societies which was kicked off last week. I think it is a tribute to the leadership at AAES.

And I want to thank our other witnesses for—

Dr. **Cox**. May I comment on that?

Mr. **Ritter**. Yes.

Dr. **Cox**. While it is not part of this committee's purview, to be a true national or international leader, we are going to have to focus on science and math education in our workforce. We cannot be a world leader if we have a technically illiterate population. I think that it is very critical that we focus on math and science education from grades kindergarten through twelfth grade, not to mention the college. But our workforce needs to be better educated in math and science if we are going to achieve what we need to do.

Mr. **Ritter**. I couldn't agree with you more.

Mr. Chairman, thank you. I yield back the balance of my time.

Mr. **Valentine**. Thank you.

I again thank each of you for your time here, for the time you put into preparing yourselves to come and testify.

This subcommittee will now be in recess until 9:30 a.m. tomorrow morning at this same place.

[Whereupon, at 5:05 p.m., the subcommittee recessed, to reconvene at 9:30 a.m.,

AMERICAN TECHNOLOGY PREEMINENCE ACT
H.R. 1989

WEDNESDAY, FEBRUARY 27, 1991

U. S. HOUSE OF REPRESENTATIVES,
COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY,
SUBCOMMITTEE ON TECHNOLOGY AND COMPETITIVENESS,
Washington, D.C.

The subcommittee met, pursuant to recess, at 9:40 a.m. in room 2318, Rayburn House Office Building, the Honorable Tim Valentine [chairman of the subcommittee] presiding.

Mr. VALENTINE. Good morning, ladies and gentlemen. Welcome to the second day of the Technology and Competitiveness Subcommittee's hearings on the fiscal year 1992 budget for the Technology Administration of the Department of Commerce.

Today we are honored to have with us the Honorable John W. Lyons, Director of the National Institute of Standards and Technology, NIST; the Honorable Deborah L. Wince-Smith, Assistant Secretary for Technology Policy at OTP; and Doctor Joseph F. Caponio, Director of the National Technical Information Service, NTIS, who will offer their insights on the proposed fiscal year 1992 budget for their respective organizations.

In general, the budget news is very good. The Bush Administration has requested a significant increase of 15 percent for the National Institute of Standards and Technology's intramural programs, and 18 percent for the Office of Technology Policy. We are heartened by this show of support, and we shall take this as a sign that the Administration has begun to take the Technology Administration's role in promoting industrial competitiveness seriously, and continue that support.

However, we don't want to give the impression that we are completely satisfied with the Administration's budget. We are disappointed that the Advanced Technology Program has not been given a significant increase as well. This program, frozen at last year's funding level, was established to assist United States business to commercialize important new scientific discoveries; and technologies and has the potential for significant economic impact. Other important outreach programs at NIST, such as the State Technology Extension Service, the Non-Energy Related Inventions Program, and the fire and building research programs, have either been phased out or give decreased funding levels, as well.

In addition, the modernization effort at the National Technical Information Service is in serious need of financial support. We plan to discuss that agency's budget problems this morning as well.

We are also privileged to have with us some distinguished non-Government witnesses as well: Mr. Clyde Prestowitz, President of the Economic Strategy Institute; Doctor John P. McTague, Vice President of Technical Affairs at Ford Motor Company, and a former Presidential Science Advisor; and Mr. Joseph O'Grady, President of the American Society for Testing Materials. Welcome to all of you.

Before I yield to the ranking member, my good friend, Tom Lewis, let me ask the witnesses, please if you would summarize and keep your statements to five minutes, if you can, we're going to try to keep time today. At yesterday's hearing, as we are prone to do, we spent most of the time on the first panel and were not able to get into many questions. Your prepared statements will appear in the record, as you know, as presented to us. If you could help us to that extent, we would appreciate it very much.

Mr. Lewis?

Mr. LEWIS. Thank you, Mr. Chairman.

Yesterday, the subcommittee heard thoughtful testimony from both agency and private sector witnesses. We found that the Administration's fiscal year 1992 budget request for NIST was 15 percent higher than the fiscal year 1991 appropriated level. We heard about the advances in the programs and the numerous awards were excellent in research. The private sector witnesses expressed strong support for the increased funding requested by the Administration. Several pointed out additional areas that need even greater support. Nevertheless, in these days of tight budgets, we need to make sure that each dollar authorized is efficiently and wisely allocated.

So that we can make these decisions, I hope today's witnesses will share with us their priorities for funding programs. At the same time, I would like to hear the witnesses' views on programs that may be ineffective and why so.

Mr. VALENTINE. Thank you.

Mr. Swett, do you have an opening statement?

Mr. Gilchrest, do you have anything you would like to say at the outset?

Mr. GILCHREST. Yes, Mr. Chairman, just something very quick. The regional—I would like to get a sense of the importance of the regional manufacturing centers, the extra mural programs, as far as reaching out to certain areas of the Country to help save some failing high tech industries, specifically those that seem to be so heavily dependent upon the military, so there's no sense of security in that particular community—those kinds of things.

Thank you, Mr. Chairman.

Mr. VALENTINE. Thank you.

Ms. Horn?

Mr. Ritter?

Mr. RITTER. Just a brief word, Mr. Chairman, thank you. I want to welcome our distinguished witnesses and would hope that perhaps we could get a good feel today for how NIST is fulfilling its mission to kind of lead the Federal charge on making manufacturing more competitive, how NIST is helping to boost the idea of made in America with some reference to the regional manufacturing centers and the rationale behind the funding request with reference to the advanced technology program and the kind of limit the Administration has placed on it. As someone who was there at the ground floor in the formation of the advanced technology program, I certainly have a strong interest in that.

Also, how you plan to—we heard something about it yesterday—but how you would plan to build upon the successes of the Malcolm Baldrige National Quality Award, and what are the kinds of resources that you see are necessary to come into the picture, both in the private sector and here in the appropriations process on the Hill.

So without further ado, Mr. Chairman, I yield back the balance of my time and look forward the testimony of our distinguished witnesses.

Mr. VALENTINE. Thank you, sir.

Mr. Thornton?

Ms. Collins?

I think that takes care of everybody here.

Doctor Lyons, you are the first name on my list, and we will be happy to hear from you at this time. Welcome.

STATEMENT OF JOHN W. LYONS, DIRECTOR, NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY, GAITHERSBURG, MARYLAND

Dr. LYONS. Thank you, Mr. Chairman. It's a pleasure to be here. I do have a long statement, which I assume will be incorporated into the record.

Mr. VALENTINE. It will.

Dr. LYONS. I'm pleased to appear before you today to request reauthorization of appropriations for the National Institute of Standards and Technology for fiscal year 1992, and to discuss the programs and activities of NIST.

If I can't answer your questions, I have a number of people with me who can. At my right is my associate director for programs and budgets, Samuel Kramer, behind me my budget officer, Tom Gary, who was here yesterday with Doctor White as well. So one way or another, we should be able to address your concerns.

This year the President is requesting $248 million for NIST, an increase of $35.6 million, or 15 percent, over the fiscal year 1991. This request includes $201.8 million in intramural appropriations and $46.2 million for the extramural efforts.

I'm pleased to report that the President's long-term budget projections for NIST will result in a budget for our laboratory work that is nearly doubled by 1996.

Today, NIST is a far different laboratory than it was as NBS just three short years ago. We have over 1,000 guest scientist, approximately 200 of those from industry, working with us. We have entered into 88 cooperative R&D agreements with industry and academia, and have 33 more in process, which makes us one of the leading laboratories in the Government. We are in the closing stages of our first competition for the Advanced Technology Program, which provides funding directly to U.S. businesses and consortia of businesses for the development of precompetitive, generic technologies.

We now have three Regional Centers for the Transfer of Manufacturing Technology—or MTCs—in South Carolina, New York and Ohio—in operation; and we are about to complete the process of selecting two more for funding during fiscal year 1992. Under the State Technology Extension Program, we awarded funding to nine States for two types of demonstration projects and will announce a final competition for funding for this year shortly.

We believe this set of expanded activities enhances NIST's abilities to respond to the needs of industry and the U.S. economy. These partnerships with industry, academia, and State and local governments have the potential to increase the leverage and economic impact of the Institute.

Last years increases reinvigorated our research programs and allowed us to expand linkages to industry in the development both of measurement-related science and technology and precompetitive generic technologies with high commercial potential. However, the demands for NIST's services continue to exceed our capability to respond.

We are very pleased with the support given NIST in the President's fiscal year 1992 budget. In it, the President states, "The budget proposes a 15 percent increase to a total of $248 million for NIST. The long-term budget projection will result in a budget for NIST that is approximately doubled by 1996. NIST carries our R&D which supports standards development and advances measurement techniques, both of which are critical to improving product quality, allowing for effective use of new technologies, and improving public safety."

Our budget request contains important increases which will allow us to undertake some needed catch up, given the fact that we have had an essentially flat budget for the last 15 years.

In fiscal year 1992, $22 million of our proposal for intramural research is to support new laboratory projects in areas such as semiconductors, superconductors, intelligent machines, advanced microwave and fiber optic communications systems, intelligent materials processing, computer security criteria, and some work on chlorofluorocarbon refrigerants, and the development of safety practices and construction standards to protect lifeline systems from damage during earthquakes—all those very important topics.

In addition, we have $10 million plus for adjustments to base.

We are requesting $4 million this year for critically needed and overdue refurbishment of our 25 and 35 year old laboratories in Gaithersburg and Boulder, Colorado. This increment is for safety and environmental problems and to upgrade inadequate heating, cooling, and electrical systems.

The NIST Visiting Committee has stated in its 1990 annual report to the Secretary that "perhaps no other budget item is as important to the long-term well-being of the Institute" than rehabilitation of its facilities.

Let me just list the programmatic increases in the budget. Under electronics, we have asked for $11.5 million in new funding for new work in semiconductors, magnetics, superconductors, microwaves, and lightwaves.

In the manufacturing area, we are asking for $4 million. This is for intelligent machines work and also Product Data Exchange Standards known in this Country as PDES, and overseas as STEP.

In the chemistry area, we're asking for $1.5 million for sensors work and new reference data, especially for chlorofluorocarbon alternatives.

In materials work, we're asking for $1.2 million for additional work in intelligent materials processing.

In building and fire research an additional $1 million for seismic safety practices, for lifelines where there are currently no standards.

In computer systems, we are asking for $2.8 million to enable us to more adequately address the Computer Security Act of 1987 as well as to accelerate the development of ISDN standards for advanced telecommunications systems.

Let me say a word or two about our extramural programs. While the extramural request is $2.9 million less than for fiscal year 1991, the fiscal year 1992 outlays will actually increase a little bit due to carryover funding, which I believe Mr. Ritter got into yesterday and we'll probably get back to again.

The advanced technology program request is the same as the 1991 base appropriation, $35.9 million. We've almost completed our process. Our final selections for the first series of awards under the ATP program are now in the Department of Commerce process. We had about 250 applications. About half of these were in electronics and material science and significant numbers in information technology, manufacturing, energy, and environmental science. I think no surprises there.

The manufacturing technology centers will, if the 1992 budget request is met, fund six regional centers. That means that we will select two this year and one additional one will be selected next year.

We are requesting termination oft he State Technology Extension Program because we believe these functions are being performed through other NIST and other Federal programs. We prefer to focus our efforts in our outreach areas on ATP and MTC efforts.

That completes my formal statement, Mr. Chairman. We will be happy to take the questions in our turn.

[The prepared statement of Dr. Lyons follows:]

NIST
UNITED STATES
DEPARTMENT OF COMMERCE
NATIONAL INSTITUTE OF STANDARDS
AND TECHNOLOGY

U.S. DEPARTMENT OF COMMERCE
STATEMENT OF JOHN W. LYONS, DIRECTOR
NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
BEFORE THE SUBCOMMITTEE ON TECHNOLOGY AND COMPETITIVENESS
HOUSE COMMITTEE ON SCIENCE, SPACE AND TECHNOLOGY

February 27, 1991

Mr. Chairman and Members of the Subcommittee, I am pleased to appear before you today to request reauthorization of appropriations for the National Institute of Standards and Technology (NIST) for Fiscal Year 1992, and to discuss the programs and activities of NIST.

This year the President is requesting $248 million for NIST, an increase of $32.7 million, or 15-percent, over the Fiscal Year 1991 appropriations of $215.3 million. This funding request includes $201.8 million in intramural appropriations and $46.2 million in extramural appropriations.

I am pleased to report that the President's long-term budget projections for NIST will result in a budget that is nearly doubled by 1996. The Administration, Secretary Mosbacher and Under Secretary White have been very supportive of NIST. This long-term budget strategy continues the effort begun in Fiscal Year 1991 to expand NIST's ability to provide appropriate technical support for the American economy. It is designed to strengthen NIST research programs in support of U.S. industry in economically important areas such as electronics, advanced materials, computers, communications, industrial chemical technology, and manufacturing. Collectively these fields are a powerful driving force for the U.S. civilian economy. It is largely in these fields that technology advances are creating multi-billion dollar markets for new products.

The decade of the 1990s may be the most exciting and demanding for NIST since it was created as NBS in 1901. The Omnibus Trade and Competitiveness Act of 1988 rechartered us as a new Institute--NIST--by establishing new programs and approaches on a successful foundation at the old National Bureau of Standards. The Act confirms the importance of the existing NBS functions, and reaffirms the primary NIST mission to promote the competitiveness of U.S. industry. The Act gives the Institute explicit new authority to help industry develop measurement-related and other precompetitive, generic technologies and adds new capabilities--a set of innovative, extramural programs.

Today, NIST is a far different laboratory than it was as NBS. We have over a thousand guest scientists, with approximately 200 directly from industry, working at NIST with our scientists and engineers. Currently, we have entered into eighty-eight cooperative research and development agreements with industry and academia, and have thirty-three more in process. We are in the closing stages of our first competition under the Advanced Technology Program (ATP). The ATP will provide funding directly to U.S. businesses and consortia for the development of precompetitive, generic technologies. We have three Regional Centers for the Transfer of Manufacturing Technology--in South Carolina, New York and Ohio--in operation; and are in the process of selecting two more for cooperative funding in Fiscal Year 1992. Under the state technology extension program, we awarded funding to nine states for two types of demonstration projects. We will announce a final competition for funding under this program shortly.

We believe this set of expanded activities can enhance NIST's abilities to respond to the needs of industry and the U.S. economy. These partnerships with industry, academia, and state and local governments have the potential to increase the leverage and economic impact of the Institute. However, we must realize that the extramural programs are both innovative and experimental requiring careful evaluation. To this end, the original three centers will undergo an outside review at the end of this year.

We view NIST's mission as containing three main elements --enhancing competitiveness, public health and safety, and maintaining a science base. These are consistent with and strongly supportive of Department of Commerce and Technology Administration goals.

In partnership with industry and government, NIST conducts research and provides measurement-related technical services to enhance the competitive posture of the United States in global markets. This partnership covers the entire cycle from definition of needs and ranking of priorities, through execution of research programs, to making the results available to U.S. industry.

NIST conducts research in selected areas of public health and safety and the environment, again in partnership with industry and government. Some of these are mandated by special statutes--earthquake hazard mitigation, elimination of chlorofluorocarbons--and one, fire research, is part of the basic NIST authorization.

The final element of our mission is a broad program of scientific research to underpin the technology programs. In addition, this scientific research is motivated by NIST's charter to provide technical services to the scientific and engineering communities. These activities range from fundamental inquiries into natural phenomena to improving our knowledge of the fundamental constants on which the sciences depend for quantitative work.

NIST's broad and comprehensive assignment and the resulting diversity of its customers have always led to competition for resources and management attraction. This has been intensified by the new extramural programs. Our mission requires that NIST be dedicated both to science and to technology, to fundamental research and to applied activities, to appropriate support of commercial activities in industry and to public health and safety, and to laboratory work and now to management of new extramural programs. The challenge to management is to manage the tension created by the different assignments to strengthen the entire activity. For example, the fundamental research base at NIST is important in itself as a contributor to the scientific and engineering community but it is also crucial for providing the intellectual base for the applied programs, keeping them informed and using the latest information and techniques. The research program is also critical for recruiting new staff to NIST.

In Fiscal Year 1991, the Institute received a 31 percent increase over the previous year in its combined intramural and extramural appropriations. These increases included a 10 percent increase in intramural appropriations and the rest was for the new extramural programs.

The Fiscal Year 1991 increases reinvigorated the Institute's research programs and allowed us to expand our linkages with U.S. industry in the development of measurement-related science and technology and precompetitive, generic technologies. However, the demands for NIST's services continue to exceed our capability to respond. We are very pleased with the support given NIST in the President's Fiscal Year 1992 budget. In it, the President states "The Budget proposes a 15 percent increase to a total of $248 million for NIST. The long-term budget projection will result in a budget for NIST that is approximately doubled by 1996....NIST carries out R&D which supports standards development and advances measurement techniques, both of which are critical to improving product quality, allowing for effective use of new technologies, and improving public safety." Our budget request contains important increases which will allow us to undertake some needed catch up, given the fact that we have had an essentially flat budget for the last fifteen years.

The $35.6-million increase for NIST intramural programs and facilities for Fiscal Year 1992 represents a 21.4-percent increase over Fiscal Year 1991 funding levels. While the extramural Fiscal Year 1992 request is $2.9 million less than that of Fiscal Year 1991, Fiscal Year 1992 program obligations will be increased to $49.6 million due to carryover funding.

In Fiscal Year 1992, $22 million of our proposal for intramural research initiatives is to support new laboratory projects including: the accelerated development of measurement technology and standards for high-temperature superconductors, intelligent machines, advanced microwave and fiber optic communications systems, and intelligent materials processing; the establishment of security criteria and evaluation measures for computer and telecommunications operating systems; the collection of thermophysical property data needed to develop alternatives to chlorofluorocarbon refrigerants; and the development of safety practices and construction standards to protect "lifeline" systems from damage during earthquakes.

In addition, $10.4 million is needed for adjustments to base to account for cost of living increases. We also have budget decreases totalling $750,000 in intramural programs. Our extramural programs are being decreased by $2.9 million in 1992. I will discuss these all in more detail.

We are also requesting $4 million for critically needed and overdue refurbishment of the Institute's 25 to 35 year old laboratory facilities to correct safety and environmental problems and upgrade inadequate heating, cooling, and electrical systems.

Our long-term strategy for NIST requires that the Institute's facilities be brought up to today's standards for a first-class research laboratory. The NIST Visiting Committee on Advanced Technology stated in its 1990 annual report to the Secretary of Commerce that "perhaps no other budget item is as important to the long-term well-being of the Institute" than rehabilitation of its facilities. One of the principal deficiencies of current NIST facilities is the technical obsolescence of temperature, humidity, air cleanliness, and vibrational controls. With today's ultra precise measurement needs (substances often must be measured at the part-per-billion level), high-quality, reliable environmental controls are essential.

We also face safety and environmental problems caused by outdated underground storage tanks, overhead cranes, and electrical transformers, as well as inadequate fire and mechanical alarm and control systems. Failure to bring the NIST facilities up to current fire codes will endanger employees and risk much higher costs from a catastrophic failure.

We are severely strained in our capacity for providing heating, cooling, and electrical service. The chilled water system that provides heating and cooling to the Gaithersburg facilities routinely runs at full capacity. It can no longer meet the needs of NIST's energy-intensive research, and we have no back-up utility system to avoid the extremely high research and financial costs that would result from disruptions in service. In addition, the Boulder laboratories already have experienced two site-wide power outages in 1990 due to inadequate power supplies.

I would now like to discuss some of our laboratory research program accomplishments and our Fiscal Year 1992 initiatives.

Electronics and Electrical Engineering

In U.S. manufacturing, the electronics industry is the largest employer and is tied for first place in shipments with the chemical industry. Electronics exerts an extraordinary influence on the performance of every other U.S. industry and is undergoing an unprecedented rate of change as new technologies emerge. In the process, the electronics industry is outstripping available measurement support, seriously hampering U.S. competitiveness in an industry that relies so heavily on measurements.

Our laboratory programs support the fundamental electronic technologies of semiconductors, magnetics, superconductors, optical fibers, microwave communications, electrical power systems, and electronic measurement instrumentation.

NIST is currently working, in collaboration with the Defense Applied Research Projects Agency, to provide the first U.S. facility for industry-government collaboration in the characterization of digital image processing strategies. This facility will enable industry to evaluate key aspects of advanced imaging, from resolution to frame rate, to compression algorithms, in close contact with NIST staff who can identify key measurement barriers inhibiting the emergence of this new technology.

Just recently, a patent was issued on a NIST transconductance amplifier design which can source currents up to 35 A rms at 100kHz, with short-term instability of less than plus or minus 25 parts per million. This combination of output current and frequency exceed by a factor of 15 the previous best for transconductance amplifiers. Several companies have expressed strong interest in the NIST amplifier, and one company is finalizing a licensing agreement that will permit it to market a commercial product based on the NIST design.

In our Fiscal Year 1992 budget request, we are requesting an increase of 121 positions and $11.5 million in the area of Electronics and Electrical Engineering.

A strong electronics industry is a vital component of maintaining a competitive industrial nation. Semiconductors play an important role in this industry. We are requesting 39 positions and $4.0 million to address more comprehensively the program of technical support services for the electronics industry for new generations of semiconductor devices, a program which was started in fiscal year 1991. The National Research Council (NRC) has said, "Over the past three decades, no single field of science or engineering has had a greater impact on the national productivity and quality of life in the United States than has semiconductor microelectronics."

This request includes 14 positions and $1.5 million for the establishment of a formal program in magnetic measurement technology. NIST researchers will develop new measurement technologies capable of determining magnetic properties in dimensions of only a few hundred billionths of a meter. This technology is critical for developing increasingly high-density magnetic disks used in personal computers and many other applications.

We are also requesting an increase of 20 positions and $1.8 million for expansion of the current highly successful fundamental research program in superconductivity to include more applied tasks as we move closer to commercial production of superconducting materials. These tasks include development of standards, measurement technology, and data for specific engineering applications of superconductivity.

We have requested 18 positions and $1.9 million for the development of new measurement methods and standards to help industry develop and market new microwave products with higher performance and information-handling capacity. Microwave systems are essential to emerging applications of remarkable scope, including digital pocket cellular radio telephones with worldwide access, expanded worldwide corporate and government communications systems, and advanced video.

And lastly, in the area of electronics, we are requesting 30 positions and $2.4 million for further enhancement of the lightwave measurement technology program. The increase will allow full funding for better methods to measure the performance of modulators that transform lightwaves into optical signals and couplers that combine or split lightwave signals among optical fibers. This increase would also cover measurement development for integrated circuits and related electronics that combine optical and electrical signals. Over a 10-year period, economic benefits in improved industrial productivity from this NIST program in lightwave measurement is expected to exceed $1 billion.

Manufacturing Engineering

NIST programs also support the U.S. mechanical engineering industry through research and measurement services oriented to a modern automated environment. The discrete parts industrial sector served by these programs produces over 10 percent of the total gross national product in manufacturing and include the automotive, commercial aircraft, consumer electronics, and machine tool industries. Over half the U.S. trade deficit is in this industrial sector.

In manufacturing, post process inspection, which is essentially a sorting process, can no longer meet the demands for low cost quality. An example of ongoing NIST work in this area is a new system pioneered at NIST that uses computer based process control to assure that one "makes it right the first time." In-process error correction of the machine is a vital element in this new algorithm. We are currently applying this new system to a turning center (lathe) on some of the most demanding products in the world, level one fasteners for nuclear submarines. These ongoing efforts will provide increased expertise and further refine the error correction of control systems.

Our budget request for FY 1992 in manufacturing engineering is for an increase of 46 positions and $4.0 million. Our request includes 32 positions and $2.5 million for the expansion of the intelligent machines research program that addresses fundamental problems faced by U.S. industry in developing a new generation of intelligent machine systems. These new systems will operate from data supplied by computer-aided design and engineering systems in standard data format, and will use sensors to measure the manufacturing process and to correct automatically for variations and defects to achieve higher quality at lower cost. To help facilitate the use of intelligent machines, NIST will research design principles and models of production processes, as well as advanced sensors and better methods of representing knowledge in forms machines can interpret.

In addition, we are requesting 14 positions and $1.6 million for the Product Data Exchange Standards known as PDES/STEP. This standard would allow U.S. manufacturers to better integrate product design, manufacturing, marketing, maintenance, and improvements, an area that has been a traditional weakness for many U.S. businesses. The standard would provide a way for manufacturers to express all useful information about a product's dimensions, materials, performance characteristics, and other data in a digital form accessible to its suppliers, contractors, and other supporting groups. The multi-enterprise concurrent engineering approach facilitated by PDES/STEP can produce reductions of 50 percent in engineering design changes, 40 percent for total product development time, 30 percent in manufacturing costs, and 75 percent in scrap produced and reworking needed. I would like to note that in-house research in manufacturing directly supports our ability to transfer leading edge manufacturing technologies and techniques to the private sector through programs such as the MTCs.

Chemical Science and Technology

Quality is a very important component of success in international markets, and the ability to make accurate and precise chemical compositional measurements is a prerequisite for producing quality products in many industries. The chemical, energy, health care, biotechnology, electronics, and materials processing industries are key users of chemical measurements and chemical engineering technology data. This past year, NIST organized a consortium of industry and government researchers with the goal of developing a prototype automated analytical chemistry laboratory. The aim of the Consortium on Automated Analytical Laboratory Systems is to help the U.S. chemical industry to utilize major advances in automation by producing a generic automated laboratory which can be readily adapted by members for their individual needs. We are currently working with the consortium to develop initial designs for uniform sample and information transfer protocols (hardware and software) between modules; and to complement the efforts of instrument manufacturers to automate the detection and data reduction components of the analytical chemistry process. We are assembling the first prototype module for an inorganic automated analytical laboratory system which will consist of a weighing station, microwave oven and robotic sample handler under computer control.

As part of our ongoing programs, we are also working with the health industry to develop two-dimensional electrophoretic separation techniques, computer based imaging techniques, and multivariate data analysis methods for correlating cellular protein modulation in human biopsy materials with diagnosis, treatment, or chemoprevention of cancer.

Our FY 1992 budget request for chemical science and technology is for an increase of 13 positions and $1.5 million.

Additional investments in chemical measurements and standards will be focused on supplying high-technology industries with the sophisticated new measurement methods and devices they need to produce a wide array of products to an ever higher degree of specifications. The measurement costs incurred in these high-technology industries are three to five times higher than in those using traditional technology. For some manufacturing applications, chemical testing can account for 80 to 90 percent of unit production costs. The optical and electrochemical sensors which will be developed by NIST researchers through this initiative could be used by industry to make on-line measurements that significantly reduce the number of rejected products and the amount of waste created during manufacturing. This requested increase also covers expanded NIST capabilities in producing the latest versions of sophisticated mass spectrometry data and in collecting thermophysical properties data needed for the development of alternatives to chlorofluorocarbon refrigerants.

Materials Science and Engineering

Technological progress in such diverse fields as electronics, construction, energy, communications, and transportation hinge on the development of advanced materials with properties and performance characteristics far superior to materials used today. Research on advanced ceramics, metal alloys, polymers, composites, and the new high temperature superconductors has already revealed some of the future technological opportunities, including the ability to microengineer materials to create structures and combinations of elements unknown in nature, that have resulted in properties and phenomena unachievable until recently. The challenge for industry is to transform these materials from laboratory curiosities to viable products and manufacturing processes.

Part of NIST's ongoing work in this area is to provide needed advanced measurement capabilities for the characterization and development of classes of advanced materials. Current NIST research in materials science and engineering includes research to develop sensors for improvements in sheet steel processing, to better understand the performance of polymer composites, to characterize thin films important in electronics and coatings, and to evaluate advanced materials for microelectronics packaging.

We now have two new workstations in operation at our Cold Neutron Research Facility–the 8-meter small-angle neutron scattering spectrometer (SANS) and the cold neutron depth-profiling instrument (CNDP). With the SANS the measured neutron intensity on a sample is greater than 85 percent of the intensity achieved in the reactor hall, with a signal-to-noise ratio more than four times better. A variety of experiments have already been conducted, including studies of colloidal mixtures under shear, temperature dependence of bonded phase structure in microporous silica, polymer conformations in blends, ultrathin films and solutions, microemulsions, and high temperature superconductors. The CNDP is a nondestructive technique for determining the near-surface atomic composition of semiconductor and other advanced materials. It is capable of operating under ultra-high vacuum conditions and has incorporated many design features that enhance previously available capabilities. The CNDP provides the capability to study problems which cannot now be attempted, including the location of impurities that may lead to circuit failure. Initial measurements completed on CO-NI Oxide have provided the near-surface distribution of oxygen for the first time by any nondestructive technique, anywhere in the world, and confirms the order-of-magnitude increase in sensitivity which was predicted for the cold neutron research facility.

Our initiative request for FY 1992 in materials science and engineering is for 10 positions and $1.2 million.

Annual U.S. shipments of advanced materials and products made from them are currently valued in excess of $70 billion. The greatest barrier to industrial use of advanced materials is a lack of reliable process technologies that consistently yield high-quality products a low cost.

Our initiative in this area will expand a Fiscal Year 1991 initiative in intelligent processing of materials. NIST researchers will develop the generic technology base necessary to measure the performance of and establish standards for future generations of intelligent materials processing. This research will include creating a prototype version of a database that can control a manufacturing process so that it automatically achieves reproducible, well-controlled, and specifically tailored properties in a finished product.

Building and Fire Research

In the NIST's building and fire research program, we provide technologies to predict, measure and test the performance of construction and fire prevention and control materials, components, systems and practices; and conduct research in earthquake hazards reduction. NIST's current programs also assist the construction and fire safety communities in achieving the benefits of advanced computation and automation in order to increase the usefulness, safety and economy of buildings, to improve the productivity and international competitiveness of the construction industry, and to reduce the human and economic costs from unwanted fires and earthquakes. NIST currently performs and supports laboratory, field and analytical research on the performance of construction materials, components, systems and practices, and the fundamental processes underlying initiation, propagation and suppression of fires.

This past year, NIST issued a database for refrigeration engineers, chemical and equipment manufacturers, and others who work with clorofluorocarbons to use in evaluating the performance of alternative refrigerants and refrigerant mixtures for use in building cooling systems, large cooling equipment, and appliances. The database package enables the user to assess several environmentally acceptable refrigerants and mixtures as possible replacements for currently used materials. It is also useful to help determine the efficiency and capacity of a wide range of equipment that will operate with alternative refrigerants.

NIST is also currently providing the Chairman and Secretariat for the Interagency Committee on Seismic Safety in Construction which is implementing the President's Executive Order on Seismic Safety in new Federal buildings. The guidelines and procedures to implement the Executive Order which requires the use of seismic safety practices and regulations in the construction of new buildings owned or leased by the Federal government, or constructed with federally-assisted funding have been drafted.

In building and fire research for FY 1992, we are requesting 5 positions and $1.0 million for research in earthquake hazard reduction. The National Earthquake Hazards Reduction Program (P.L. 101-614) gives NIST for carrying out research and development to improve building codes and standards and practices for structures and lifelines. This new funding will support the formulation of seismic safety practices for lifelines such as water, power, gas, sewage, and communications lines. Currently there are no standards available to measure the adequacy of seismic design and construction of existing lifelines and systems and to guide the design of new systems.

Computer Systems

Through research in computer systems, NIST currently promotes the international and federal government acceptance and use of an integratable, "open" computer and communication environment and provides guidance on computer security needed to protect the information assets contained in computer based information systems.

As part of its ongoing work, NIST is a major sponsor of the North American Integrated Services Digital Network (ISDN) which brings together vendors of telecommunications equipment and major customers to promote digital public networks. The group developed implementation agreements and tests to verify conformance of computer equipment to international standards. Such tests and agreements ensure that ISDN products and services from different manufacturers and vendors are compatible and provide the user with defined applications. In a related project to develop uniform international computer standards, NIST researchers worked with their European counterparts to harmonize criteria for trusted computer systems.

NIST's request for in the computer systems area is for 34 positions and $2.8 million to enable NIST to more completely fulfill the requirements of the "Computer Security Act of 1987" and accelerate the development of emerging ISDN standards.

We are requesting 14 positions and $1.1 million for expansion of current NIST activities comply more fully with the Computer Security Act of 1987. This act assigns to the Institute responsibility for developing cost-effective measures to protect against computer "viruses," "worms," and other types of malicious software. Current computer systems and networks are so complex that it is extremely difficult to control access to them or even to detect their unauthorized use. It is also evident that advanced technical threats, such as viruses, represent growing and serious dangers.

With this additional initiative funding, NIST will help the federal community improve the security of its existing systems. NIST will also work with the National Security Agency and the European Community to establish criteria and evaluation measures for computer and telecommunications operating systems, to allow them to be accredited as "trusted" information systems meeting agreed-on minimum requirements.

We are also requesting 20 positions and $1.7 million to continue the standards work begun in Fiscal Year 1991 for an ISDN that would allow simultaneous transmission of voice, text images, and data over telephone lines. This request includes $800,000 to support the President's High-Performance Computing and Communications (HPCC) initiative. Medium-speed transmission rates over such a network would occur at up to 600 million bits of information per second compared with standard telephone transmission rates of about 8,000 bits per second.

The requested funding will be used to provide for industry and government to work together in refining implementation of medium-speed base standards for this important new technology. It will also support work to evaluate the performance of parallel processing integrated circuits that will be used in generating ISDN signals.

Physics

NIST conducts research to apply fundamental physical phenomena involving atoms, molecules, plasmas, condensed matter, and radiation to the development of advanced standards, measurement methods, and data bases in support of industrial research and development programs and emerging technologies. In an number of high technology fields, particularly those using electronic and optical devices, industry is evolving toward ultra-small, atomic-scale systems, and we must understand their performance and fabrication in terms of atoms and molecules. The growth of semiconductor devices and the magnetic properties of ultra-thin films depend critically on the structure of the first few atomic layers of material grown on a substrate. NIST currently has the experimental capability to study the atomic layer growth process and the effect that the microstructures have on electronic and magnetic properties. As a part of ongoing research, NIST showed, using scanning tunneling microscopy techniques, that we could move chains of Cesium atoms around on a Galium Arsenide substrate at room temperature. We were also able to creat cesium chain structures that do not naturally occur, using what we believe to be field induced diffusion.

Advanced Computing and Adjustments to Base

We are also requesting $10.4 million in adjustments to base for Fiscal Year 1992. These funds include $2.5 to continue the upgrade of the Institute's Scientific Computing System. In December we awarded a contract to Cray Research, Inc., for a new supercomputer system consisting of a Cray Y-MP2/216, which is a two-processor machine with 16 million 64-bit words of memory. This is the first stage of the planned modernization of our central scientific computing facilities, that also serve the National

Oceanic and Atmospheric Administration's Environmental research Laboratories, and the DOC Institute for Telecommunications Sciences. We are also requesting $900 thousand to fund additional administrative costs associated with the Advanced Technology Program (ATP), $914 thousand as a one-time adjustment to fund the increased cost of the guide tables for the Cold Neutron Research Facility and $6.0 million for pay raise and other cost of living adjustments.

Decreases totaling $750 thousand are being taken in Fiscal Year 1992. These include $250 thousand due to the completion of the upholstery ignition project, $150 thousand for the discontinuance of the non-energy related inventions program, and $350 thousand in administrative savings stemming from the reorganization of the building and fire.

I would now like to discuss our extramural programs. While the extramural Fiscal Year 1992 request is $2.9 million less that of Fiscal Year 1991, Fiscal Year 1992 program outlays will be increased to $49.6 million due to carryover funding.

Advanced Technology Program

The request for the ATP is $35.9 million, equal to the Fiscal Year 1991 appropriation. The ATP awards several multi-year grants each year directly to U.S. businesses for the research on precompetitive generic technologies. The grants are awarded under shared-cost agreements in fields such as electronics and semiconductors, advanced manufacturing, advanced materials, information and communication, and biotechnology.

Selection of proposals for ATP awards - the first of which are expected to be made the first week of March - is based on a multi-stage review process, involving both technical and business experts. As directed by the Small Business Innovation Development Act of 1982, 1.25 percent or approximately $450,000 appropriated for this program will be directed to the Department of Commerce's Small Business Innovation Research Program.

We are in the final stages of our first competition under the Advanced Technology Program (ATP). We received 249 applications for research funding under this first competition. About half the applications were in electronics and materials science, and significant numbers were in information technology, manufacturing, energy, and environmental science. We have completed oral reviews for the semifinalists. We expect to announce the awards any day.

Manufacturing Technology Centers

For the Manufacturing Technology Centers program (MTC), we are requesting $10.3 million, a decrease of $1.6 million from the Fiscal Year 1991 level. This amount will be added to $3.4 million in Fiscal Year 1991 carryover funding for this program. Six regionally based centers serving approximately 2,400 small and medium-sized U.S.-based manufacturing companies will be funded with this appropriation.

We have three Regional Centers for the Transfer of Manufacturing Technology--in South Carolina, New York and Ohio--in operation; and are in the process of selecting two more for cooperative funding in Fiscal Year 1992. Four finalists have been selected, and site visits are being made, for the two centers to be established this year. We expect to announce the award of the two new Centers early next month. The site for one new center will be selected in Fiscal Year 1992, and the five centers existing at the end of Fiscal Year 1991 will receive continued funding. This year the original three center will undergo on outside evaluation to determine their effectiveness.

The MTC personnel introduce companies to technologies and techniques which can improve quality and efficiency. The MTCs work closely with community and technical colleges to identify and serve smaller firms, and to provide workforce training to accompany technology upgrades.

We are also requesting the termination of the State Technology Extension Program, a decrease of $1.3 in Fiscal Year 1992. The functions performed by the program are being accomplished through other NIST programs and other federal programs. We will be focussing our efforts in this area on activities under the ATP and MTC programs.

I would like to now give you an up-date on our Personnel Demonstration Project. We have completed two full years of our five-year demonstration project. I have asked our Visiting Committee on Advanced Technology to look at the Demonstration Project and give us their thoughts and views.

We have experienced in operating the demonstration system faster and much more effective classification and hiring; greater pay flexibility, particularly at the entry level; and better rewards for excellent performers. However, we have found that we still have difficulties competing on a par with industry or leading research universities for the most senior professionals. We hope the new Federal Employees Pay Comparability Act of 1990 will help us compete much more successfully at this crucial level.

The OPM contractor's Second Annual Evaluation Report on the NIST Personnel Demonstration project found that NIST has accomplished most of its short term Project objectives. The Report pointed out that NIST has extensively used our expanded direct hire authority, filling approximately 75% of vacancies and reducing the time required to fill the vacancies during the first two years of the project. The Report also stated that NIST has been successful in linking pay increases to performance, and that the pay-for-performance system has significantly altered the distribution of salary increases showing a strong relationship to performance rating.

That completes my statement Mr. Chairman. I will be happy to answer any questions that you or the other committee members might have.

JOHN W. LYONS

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Date of Birth: November 5, 1930

Birthplace: Reading, Massachusetts

Married: Grace C. Hanley, November 28, 1953. Four children.

Service: U.S. Army 1953-54, Honorable Discharge

Education: Degrees
Harvard University, A.B., Chemistry - 1952
Washington University, A.M., Physical Chemistry - 1963
Washington University, Ph.D., Physical Chemistry - 1964

Position:
Director
National Institute of Standards and Technology (formerly the National Bureau of Standards)

Dr. Lyons was the first (1978) Director of the National Engineering Laboratory at NIST. He was responsible for building a series of programs in technologies of interest to industry. He remained in this position until his appointment and confirmation as NIST Director in 1990.

As Director of the NIST's Center for Fire Research until December 18, 1977, he was responsible for providing scientific and technical knowledge applicable to the prevention and control of fires.

Lyons served in various research and development positions at the Monsanto Company from 1955 to 1973. He specialized in the chemistry and uses of phosphorus-based chemicals including fire retardants.

He is author of three books: Viscosity and Flow Measurements, The Chemistry and Uses of Fire Retardants, and Fire. He was co-author and editor of Fire Research on Cellular Plastics. He has contributed chapters to five other books and has written numerous papers and articles on technical or research topics. His early research interest was the physical chemistry of polyelectrolyte solutions, especially formation of complexes with metal ions. This work emphasized the behavior of inorganic polyphosphates and desoxy ribonucleic acid (DNA).

Lyons is a member of the National Academy of Engineering, a Fellow of the American Association for the Advancement of Science, a Fellow of the Washington Academy of Science, a member of the Naval Research Laboratory Naval Research Advisory Committee, a member of the Office of Science and Technology Policy Committee on Federal Laboratories, member of the American Chemical Society (past Chairman of the St. Louis Section) and member of Sigma Xi. He serves on the Advisory Committee for Engineering, National Science Foundation, and the Board of Visitors, College of Engineering, University of Maryland. He served on a special committee of the Maryland State Board for Higher Education to study the needs for engineering education (1983-84). He was Chairman of the Products Research Committee (1974-79), a nine-member charitable trust administering a $5M research fund on fire research; and Co-Chairman of the U.S.-Japan Natural Resources Panel of Fire Research (1975-78). He served as a member of the Board of Directors, National Fire Protection Association (1978-84) and American Society for Testing and Materials (1985-86). He received the Presidential Management Improvement Award in 1977 and the U.S. Department of Commerce Gold Medal, also in 1977. In 1981, he received the Presidential Rank Award of Distinguished Executive. He received the Edward Uhler Condon Award in 1986 for the book Fire.

Mr. **Valentine.** Ms. Wince-Smith?

STATEMENT OF DEBORAH L. WINCE-SMITH, ASSISTANT SECRETARY FOR TECHNOLOGY POLICY, DEPARTMENT OF COMMERCE, WASHINGTON, D.C.

Ms. **Wince-Smith.** Thank you, Mr. Chairman and members of the Committee. I am pleased to be here to discuss the President's fiscal year 1992 budget request of $3.3 million for the Office of the Assistant Secretary for Technology Policy in the Department of Commerce.

Creating and using new scientific knowledge and technology is clearly the way to generate wealth and maintain national security today and to realize the economic promises the new century holds. While the primary responsibility for developing and commercializing new technology lies in the private sector, Government policy has important effects on the state of technology and the environment governing its adoption.

We all know that the United States is unparalleled in creating new scientific knowledge and technology. The capabilities of our universities, Federal labs, and industrial labs are unrivaled in the world. However, our leadership and capacity in basic R&D alone has proven to be an insufficient competitive edge. Indeed, in my view, over the last three decades, at the very pinnacle of our technological dominance in basic R&D, the United States began to lose its leading competitive position in many high tech industries.

As President Bush recently stated—and I think this quote is a very significant one—"If America is to maintain and strengthen our competitive position, we must continue not only to create new technologies, but learn to more effectively translate those technologies into commercial products."

The pace of technological change demands that we in the United States continue to maintain our world class capabilities to create new technology. However, we cannot improve this be allocating more resources to technology creation alone. Instead, we have to focus on our ability to use and manage technology, which in my view is a process largely dependent upon a complex mix of economic, business, management, and cultural factors both in our domestic environment and increasingly in the international environment as well.

So where does the Department of Commerce fit in and the specific responsibilities of my office? By virtue of our fundamentally unique role in the Government to assist U.S. business, we are positioned to address issues affecting our Nation's ability to use and manage technology. My office is charged specifically with that responsibility.

Indeed, all the activities of my office are designed to complement and leverage industries own efforts to improve its competitiveness. American industry identifies the challenges it is facing, and acting as a catalyst and a focal point for these interests. My office is building coalitions among Government, academia, and industry to meet challenges and remove impediments when they involve more than one company, more than one industry, and more than one Government agency.

As I have mentioned, the United States has an enduring technological asset that no other Nation possesses—our Federal laboratory system. My office is coordinating the effort to put that advantage to work for us in the realm of commercial competition.

Secretary Mosbacher will soon be submitting to you the Department's second biannual report on Federal technology transfer.

Our goal now is to encourage industry to take much greater advantage of the Federal system's capabilities and technologies that result form Federal funding. I think we are all aware of the fact that many of our foreign competitors have found our Federal lab a much more enticing environment for research than some of our own companies.

Addressing these issues, and all Federal technology transfer policy issues in the Government is the role of the policy-level Interagency Committee on Federal Technology Transfer, which I chair. I might add here that this Committee has been identified by the President's Council on Competitiveness' new working group on commercializing R&D as the key link to that process. So the issues that we are examining and flushing out will then be elevated to the Council on Competitiveness for examination and potential resolution.

A major issue right now before the Committee is how to look in the ways in which we can increase industry's early participation in the Federal labs process, not waiting until technology is developed and the process is already moving too swiftly toward commercialization.

The Clearinghouse for State and Local Government Initiatives on Productivity, Technology, and Innovation is designed to leverage for national,good the technology investments and programs of our State and local governments. The Clearinghouse has made excellent progress in fulfilling its role as a repository for information and in building a network across the Country.

We have created in commerce a computerized database which contains information on 700 State and local programs and have published several information guides that are widely disseminated. This year, we will be publishing the first annual register of State and local technology programs, and we will be sponsoring two round tables with the States on issues identified as relevant to technology commercialization.

Another key competitive challenge that we are all aware of and coming to grips with is the fact that most U.S. product designs and manufacturing standards are still predominately inch-pound. The Japanese, rightly so, pointed out this competitive deficiency in the Structural Impediments Initiative talks. The Trade Act has asked the Federal Government to take the leadership in converting our industry and our Government to U.S. metric usage.

My office is responsible for coordinating Federal metric activities, and we are moving forward on this particularly important challenge. Indeed, let me mention, if I may, Mr. Chairman, one of the significant things we're doing in commerce which is related to our national export promotion initiative. Secretary Mosbacher, as you know, has gone across the Country with teams of officials throughout the Government to work with the private sector on encouraging exports of competitive goods and services.

In the programs on quality and productivity in our breakout sessions, the deal with standards and certifications, we are factoring in the metric question in all our interface with industry under that activity.

The globalization of technology has increased our involvement in international activities. I would like to quickly mention a number of initiatives now underway with U.S. industry to develop consensus on critical issues related to science and technology and its commercialization in the global environment.

My office is unique in the U.S. Government in providing the interface to work with U.S. industry to obtain their input and make sure that our commercial interests are safeguarded in international S&T agreements.

Our Japanese technical literature program is on the front line of bringing information on commercially valuable Japanese R&D to U.S. industry. We know that many firms cannot afford to access, translate, and sift Japanese technical literature on their own, and this program is an important source of information.

Next month, under the auspices of the Japanese Technical Literature Program, my office sponsoring, with the White House Office of Science and Technology Policy and the State Department, a high level two day conference for U.S. industry on accessing Japanese science and technology.

I think we're aware of many of the commercially relevant S&T initiatives that the Japanese has approached the U.S. over the last year in such areas as intelligent manufacturing, optocomputing, and machine translation. Until now, there really have been no mechanisms to obtain private sector input on how we should structure a national response to these initiatives.

Under the auspices of our Head of Government agreement with Japan, the President's Science Adviser asked the Technology Administration to take the initiative to develop a process with U.S. industry to obtain their input and guidance as to how we should respond to these initiatives. We are carrying that out through a series of workshops with industrial trade associations and U.S. firms. I might mention that in the area of intelligent manufacturing systems we have made tremendous progress in stimulating within U.S. industry itself the formation of a domestic entity to look at how we in the United States are going to proceed into the advanced manufacturing area. I believe this is going to be established in the next few weeks related to the National Center for Manufacturing Sciences. This is a direct result of my office's series of workshops in response to the initiative in IMS.

We're beginning the same process on optocomputing tomorrow. Doctor Eugene Wong and I will be co-chairing a series of workshops with U.S. industry to formulate our response to the Japanese initiative in optocomputing. Again, what we hope will come out of this is a commitment and desire on the part of U.S. industry to organize themselves domestically to deal with the challenges of optocomputing.

Our Advance Manufacturing Program promotes the establishment of shared flexible computer integrated manufacturing centers that lease time on flexible manufacturing systems and are in effect teaching factories.

As you know, among the key barriers that small and medium sized businesses face are the high cost of technical expertise needed to establish advanced manufacturing technologies and techniques.

My office developed the concept and the model for shared flexible computer integrated teaching factories and acting as a catalyst in a coalition builder across the Country, has been responsible for over $40 million being brought into these shared manufacturing centers. One of our key experts on this program, Doctor Ted Lettuce, is currently right now up at Hanscom Air Force Base working with them to set up a shared teaching factory that will bring small and medium sized business in Massachusetts into the technology base that is developed around Hanscom.

Let me finally mention one other area because I know I've gone over my time, but I think it's very important, and that is, as we know, most technologies that we refer to as enabling technologies that are very significant in the next century are very costly, complex, and broadly applicable. And it is very difficult for one individual company, or entrepreneur, or industrial sector to commercialize them.

Many off our competitors are organized differently than U.S. industry. This has provided them a hugh competitive advantage in developing and commercializing these multi-use technologies. They work on an interfirm, and interindustry basis to share long-term risks, develop technologies, quickly diffuse and assimilate them, and then capture the economies of scope inherent in these broad-based multi-use technologies.

To counter this advantage, my office is starting a new service for industry this spring. We will be providing a neutral forum in which potential users of enabling technologies can assess: the value of the technology; what R&D needs to be performed; and most importantly the ways in which the technology users and providers might organize themselves. This we hope may result in the creation of teams of noncompetitors that could accomplish the entire process of innovation, manufacturing, and marketing. We believe cross- industry teams are a natural next step in the evolution of U.S. industrial cooperation that began with the important National Cooperative Research Act of 1984, which first encouraged numerous R&D consortia comprised of competitors.

In closing, all the activities of the Office of the Assistant Secretary for Technology Policy are designed to enlist U.S. industry support and active participation in a partnership to fully use and manage our Nation's unparalleled technological assets and capabilities. I believe the United States can meet the challenges of the future that are beyond a single company's, a single industry's, or a single Government agency's ability to address, if we forge these innovative alliances among all players.

Such work for the common good has always been the Federal Government's most important and appropriate role, and the Commerce Department intends to be at the leading edge as we move forward into the technological frontiers of the 21st century.

Thank you, Mr. Chairman. That completes my summary, and I would be pleased to answer questions.

[The prepared statement of Ms. Wince-Smith follows:]

STATEMENT OF
DEBORAH L. WINCE-SMITH
ASSISTANT SECRETARY OF COMMERCE FOR TECHNOLOGY POLICY
BEFORE THE
SUBCOMMITTEE ON TECHNOLOGY AND COMPETITIVENESS
HOUSE COMMITTEE ON SCIENCE, SPACE AND TECHNOLOGY
FEBRUARY 27, 1991

Mr. Chairman and members of the Committee, I am pleased to be here today to discuss the President's fiscal year 1992 budget request of $3.3 million for the Office of the Assistant Secretary for Technology Policy.

Creating and using new scientific knowledge and technology is the way to generate wealth and maintain national security today and to realize the economic promises the new century holds. Though the primary responsibility for the development and commercialization of new technology lies in the private sector, government policy has important effects on the state of technology and the environment governing its adoption.

The United States is unparalleled in creating new scientific knowledge and technology. The capabilities of our university, Federal, and industry laboratories are unrivaled. We have always invested heavily in research and its facilities which has allowed the United States to lead the world in basic R&D. I believe, however, that leadership in basic R&D alone has proven to be an insufficient competitive edge. In my view, over the last three decades, at the very pinnacle of our dominance in basic R&D, the United States began to lose its leading competitive position in many high-technology industries.

We lost marketshares to the competition in technologies that we pioneered and in which we once dominated world markets including color TVs, tape recorders, telephones, machine tools, and semiconductors. The Technology Administration's views as stated in the Spring 1990 Emerging Technologies Report are that our R&D and ability to introduce new products is being surpassed in advanced materials, advanced semiconductor devices, digital imaging, and optoelectronics. The President stated recently, "If America is to maintain and strengthen our competitive position, we must continue not only to create new technologies, but learn to more effectively translate those technologies into commercial products."

The pace of technological change demands that we in the United States continue to maintain our world-class capabilities to create new technology. This requires the basic commitment of resources, and President Bush has requested record levels of Federal funding to support the R&D needed for our future. However, we cannot improve U.S. technological competitiveness by simply allocating more resources to create more new technology. Instead, I believe our ability to use and manage new technology is largely dependent upon a complex mix of economic, business, management, and cultural factors.

We face competitive challenges from nations which, like the United States, have recognized the importance of such factors in high-technology competition. These nations lacked first-rate capabilities to create new technology, yet they still became world-class competitors in some high-technology markets. They integrated economic, technology, regulatory, and trade policies, and concentrated on creating an environment for companies to improve management and manufacturing. In my view, this approach built formidable ability to use and manage technology no matter from where it came, and led to technological product leadership in the global marketplace. This Administration's policies underscore the central importance of these factors to technological competitiveness.

Many high-technology industries in the United States cite the cost and patience of capital as a major inhibitor to developing and commercializing new technology. Capital needs have motivated many U.S. biotechnology firms to seek alliances with foreign firms. In response, President Bush has proposed a permanent R&E tax credit, a plan to increase savings, and a capital gains tax reduction to provide an economic environment conducive to R&D investment.

In addition, the President continues to support reforming our expensive and cumbersome product liability system which many feel stifles innovation, and he reduced export controls. The National Cooperative Research Act of 1984 was designed to help reduce the impact of escalating R&D costs by reducing antitrust uncertainties surrounding cooperative R&D. Today, with the cost of establishing production facilities rising, President Bush has proposed amending this Act to cover joint manufacturing as well.

These economic and regulatory policies are targeted at reducing the cost of doing business and developing and commercializing new technology while maintaining a competitive environment. Other Administration initiatives are taking place in areas of trade law, intellectual property rights protection, and standards.

The U.S. Department of Commerce, by virtue of its fundamental mission to assist U.S. business, is uniquely positioned to address issues affecting our nation's ability to use and manage its technology. The Office of the Assistant Secretary for Technology Policy is charged with "increasing the role of technology and science in enhancing the competitiveness and economic well-being of the United States." To carry out that mission, we must understand the impediments within the complex process of developing new technology and bringing it to the marketplace. Consequently, the activities of my office are designed to complement and leverage industry's own efforts to improve its competitiveness. American industry identifies the challenges it is facing. Acting as a catalyst and a focal point for these interests, my office builds coalitions among government, academia, and industry to meet challenges and remove impediments when they involve more than one company, more than one industry, and more than one government agency.

One challenge is getting a better return on our public R&D investments. The United States has an enduring technological asset that no other nation possesses--the Federal laboratory system. My office is coordinating the effort to put that advantage to work for us in the realm of commercial competition.

New laws are now in place that decentralize the management of Federal technology and provide incentives for its commercial use. Many more Federal technologies are being patented and licensed to U.S. industry than in past years. Federal laboratory royalty income has increased ten-fold over the last three years. Invention disclosures are way up, and more than 500 new cooperative R&D agreements between Federal laboratories and industry have been established since the Act was passed. This represents real progress by any measure, and the successes will be reported later this year when Secretary Mosbacher submits the Department's second biennial Report on Federal Technology Transfer.

The Federal laboratory system has never been more accessible to U.S. industry. Our goal is to encourage industry to take much greater advantage of the Federal system's capabilities and technologies that result from Federal funding. I believe achieving this goal requires many Federal agencies to manage their technologies vigorously and engage industry in their R&D activities. Addressing Federal technology transfer issues common to all Federal agencies is the role of the policy-level Interagency Committee on Technology Transfer which I chair.

A major issue before the Committee is increasing U.S. industry's participation in Federal R&D. In my view, the speed of technical change and the rising costs of R&D mean that the potential for industry use of technology developed to meet Federal needs should be considered up-front when appropriate rather than as an afterthought once the R&D is completed. If industry gets in early on, there is a much better chance that Federal technology will reach the market before it becomes obsolete and that industry can reduce some redundancy in R&D.

The President has established a Working Group on Commercializing Federal Technology within the Council on Competitiveness. The Interagency Committee on Technology Transfer is linked to this White House working group. This allows for major problems affecting the efficient and effective transfer of Federal R&D to be addressed by the top policy-makers who handle interagency issues. For example, this Administration recently submitted legislation to extend copyright protection to federally-developed software. Such protection helps to encourage U.S. industry make the investments needed to bring valuable software to the commercial marketplace.

My office is also informing industry of the R&D it can access in the Federal system. This past year, Commerce hosted programs for U.S. industry on biotechnology and advanced ceramics, areas in which the Federal government operates some of the world's best research programs. This year, we plan a series of programs with States to highlight the economic development opportunities presented by Federally-funded R&D. The Secretary's Report on Federal Technology Transfer will contain a number of recommendations to guide our work in the future.

The Clearinghouse for State and Local Government Initiatives on Productivity, Technology, and Innovation is designed to leverage for national good the technology investments and programs of our state and local governments. The Clearinghouse is developing a network through which expertise, experiences, and resources can be shared by businesses and policy-makers alike.

The Clearinghouse has made excellent progress in fulfilling its role as a repository for information and in building a network. We created a computerized data base which contains information on 700 state and local programs. In the last six months, about 500 government policy-makers and program managers, and U.S. firms took advantage of the information the data base holds. The Clearinghouse also published several information guides that are being widely disseminated.

In the coming year, the Clearinghouse will update its data base and publish its annual register of state and local technology and competitiveness programs. We are accelerating the publishing schedule for the Clearinghouse's newsletter, and plan to sponsor two Round Tables on issues identified by the States such as program evaluation methods.

Another competitive challenge is coming to grips with the fact that most U.S. product designs and manufacturing standards are still predominately inch-pound. The Japanese pointed to this U.S. competitive deficiency in the Structural Impediments Initiative trade talks. The 1988 Trade Act stated the metric case, and Federal leadership in converting has the potential to get U.S. metric transition back on track.

My office is responsible for coordinating Federal metric activities, and we continue to press state governments, industry, and the engineering and standards communities to move forward on metric conversion. We are also working to hasten Commerce's own conversion to metric. It is difficult to predict at this time how effective Federal metric usage will be in encouraging others to convert. In the coming year we will take stock of our progress and, if the U.S. industrial infrastructure remains predominately inch-pound, other incentives may be needed.

The globalization of technology and growing foreign competition have increased our involvement in international activities. A number of multilateral initiatives are now underway to develop consensus on critical issues related to science and technology agreements and R&D cooperation. The results of these policy initiatives will have a major impact on the environment in which U.S. firms must do business. My office provides the critical interface between government and industry with respect to these initiatives, and advocates U.S. industry's needs and concerns in these fora.

I believe it is critical that U.S. firms look beyond their own walls and beyond the borders of our country for leading-edge technologies. Japanese technology capabilities are rapidly developing. Our Japanese Technical Literature Program brings information on commercially valuable Japanese R&D to U.S. industry. Many firms cannot afford to access, translate, and sift Japanese technical literature on their own, so this program can be an important source of information for a growing number of U.S. firms. Next month, under the auspices of the Japanese Technical Literature Program, we are cosponsoring, with the Office of Science and Technology Policy and the State Department, a two-day conference for U.S. industry. The conference will focus on how the United States can gain competitively from a better understanding of Japan's R&D policies and from information on Japanese scientific and technical advances, and how U.S.

industrial researchers can actually participate in Japanese government sponsored and supported R&D programs.

The Japanese have approached U.S. industry with a number of proposals for collaborative R&D in areas such as intelligent manufacturing systems, optocomputing, and machine translation. There are few mechanisms through which industry can develop an organized response to these proposals or ensure such collaborative programs are structured to provide a good return for U.S. investments in them.

Under the auspices of the Head of Government U.S.-Japan Science and Technology Agreement, the President's Science Adviser asked the Technology Administration to develop and coordinate with U.S. industry the U.S. response to these Japanese proposals. We are carrying out that charge through a series of workshops with industrial trade associations, and small, medium, and large U.S. firms. Commerce provided the forum to develop a public-private sector consensus on cooperation with the Japanese, the Europeans, and other international partners on intelligent manufacturing systems R&D. As a result, industry recognizes the importance of organizing itself to pursue domestic collaboration in precompetitive advanced manufacturing R&D. Tomorrow, I will host with my colleague in the Office of Science and Technology Policy, Dr. Eugene Wong, the first of a series of industry workshops to formulate a position on MITI's proposal for international collaboration in optocomputing, the 6th Generation Computer Program. The Japanese Technical Literature Program will be instrumental in improving U.S. access to technical developments that result from U.S.-Japanese collaboration.

The Secretary has designated my office as the Department's focal point for developing and advocating international science and technology policies that promote U.S. international competitiveness including: reviewing the Department's international science and technology programs for consistency with such policies, coordinating the Department's review of federally-supported international science and technology negotiations and related activities, advising the Secretary of State on behalf of the Department, and acting to enhance the ability of the private sector to take advantage of foreign research opportunities. Since there are now about ten Japanese researchers in U.S. facilities for every one of our's in Japan, we will continue to press U.S. industry to send its researchers to Japan and other nations.

Among the barriers small and medium-sized businesses face are the high-cost of, and technical expertise needed to establish, advanced manufacturing technologies and techniques. Our Advanced Manufacturing Program promotes the establishment of shared flexible computer-integrated manufacturing centers that lease time on flexible manufacturing systems. Five centers are now operating. In the coming year, we will work closely with the private sector and state governments in the planning and exploration phases for more shared manufacturing centers.

Some technologies are too costly, complex, and broadly applicable to be economically developed by individual companies or entrepreneurs. A few of our competitors are organized differently than U.S. industry which has provided them an advantage in developing and commercializing multi-use technologies. They can work more effectively on a interfirm and interindustry basis to share long-term risks, develop technologies, quickly diffuse and assimilate them, and capture the economies of scope inherent in multi-use technologies.

To counter this advantage, my office is starting a new service for industry this spring. We will provide a neutral forum in which potential users of enabling technologies can assess: the value of the technology, what R&D needs to be performed, and ways in which the technology users and providers might organize themselves. This may result in the creation of "teams" of noncompetitors that could accomplish the entire process of innovation, manufacturing, and marketing. We believe cross-industry teams are a natural next step in the evolution of U.S. industrial cooperation that began with the National Cooperative Research Act which encouraged numerous R&D consortia comprised of competitors.

Conducting policy analyses is a fundamental mission of my office. In the past, technology advanced slowly, foreign competition was weak or nonexistent, markets were domestic, consumer desires stable, the workplace demanded few highly skilled people, and labor was plentiful. None of these conditions exist today. Dramatic changes in the business, management, and technological environment call for continuing examination and fresh thinking on the management of technology. This is the job of our Office of Policy Analyses and Studies in coordination with other Federal agencies.

Long-term, lower-cost capital is on the top of high-technology industry's agenda. My office and the Treasury Department's Office of Corporate Finance recently sponsored a first-of-its-kind Round Table that brought together distinguished members of the financial and technical communities to explore ways in which capital can be better channeled to long-term technology investments. The participants identified several areas in which improvements could be made, and my office and the Treasury Department will be following up on those recommendations.

My office also sponsored a Round Table with U.S. industry on the linkage between industrial design, innovation and competitiveness. Product and process design largely determines a product's cost and quality. My office also strives to provide industry with insights regarding new challenges on the horizon.

For example, the Japanese, recognizing the strategic importance of industrial design, are now expanding their focus on design to engineer unprecedented measures of look, sound, and feel into advanced products. As global standards of quality enter a new dimension, U.S. industry must make better use of industrial design to deliver high-quality customized products to a discriminating consumer market.

In the coming year our policy research will focus on several areas. These include structural impediments to commercializing technology and the government's evolving role in precompetitive generic technologies. Too many U.S. firms are still encumbered by inflexible, out-dated factories that impede rapid technology commercialization. We are examining a wide range of barriers to adopting modern methods such as flexible manufacturing and concurrent engineering. Criteria on producer-supplier relationships in the Malcolm Baldrige Quality Award drew our attention to how adversarial, arms-length producer-supplier relationships can result in short-term thinking about critical investments and slow the pace of innovation.

Our research findings help guide us in policy deliberations and they are incorporated in our programs. Our new service to encourage cross-industry alliances is a direct result of our policy research efforts.

Through the President's National Medal of Technology, which honors our nation's finest creators of technology, my office has responsibility to raise national awareness of the major contribution technology has made to our economy, quality of life, and security. Working closely with the private sector, my office has a new initiative to increase the visibility and stature of the Medal by establishing the National Medal of Technology Foundation. In so doing, we have modified the Medal's competition criteria to reflect the importance, not only of creating new technology, but of commercializing it as well.

While my office does not directly contribute to the President's education goal of first in the world in math and science by the year 2000, we believe that National Medal of Technology winners are role models for motivating our young people to pursue math and science studies and careers. Accordingly, we are working with the private sector Medal Foundation to develop a program that highlights for pre-college students the exciting achievements of our nation's Medal winners and the rewards of working on the leading-edge of science and technology. Young Americans need inspirational role models like Medal winners Steven Jobs and Stephen Wozniak who launched the personal computer revolution, and Herbert Boyer and Stanley Cohen who developed the gene splicing techniques that gave birth to the biotechnology revolution and new ways to mitigate human disease and eradicate human hunger.

In closing, all the activities of the Office of the Assistant Secretary for Technology Policy are designed to enlist U.S. industry's support and active participation in a partnership to fully use our nation's unparalleled technological capabilities. Acting as a catalyst and building new and innovative alliances among all players in the science and technology enterprise, I believe the United States can meet the challenges of the future that are beyond a single company's, single industry's, or single government agency's ability to address. Such work for the common good has always been the Federal Government's most important and appropriate role, and the Commerce Department intends to be at the leading-edge as we move forward into the technological frontiers of the 21st century.

Thank you, Mr. Chairman. That completes my statement and I look forward to answering any question you or the other Committee members may have.

Mr. **Valentine**. Dr. Caponio?

STATEMENT OF JOSEPH F. CAPONIO, DIRECTOR, NATIONAL TECHNICAL INFORMATION SERVICE, SPRINGFIELD, VIRGINIA

Dr. **Caponio**. Thank you, Mr. Chairman.

Mr. Chairman and members of the subcommittee, NTIS is not requesting appropriations for fiscal year 1992 because we fund our operating expenses through the sale of information products and services. However, the fiscal year 1992 President's budget request includes language that will authorize NTIS to use up to $1.5 million to fund modernization, contingent upon the availability of sales revenues. I have submitted, Mr. Chairman, a statement for the record and would like to take this opportunity to briefly address some of our accomplishments and other items of interest.

In fiscal year 1990, NTIS acquired and made available 60,000 new Government-sponsored technical reports, and we will soon announce the addition of the two-millionth item into the NTIS collection. NTIS sold approximately 400,000 copies of technical documents in paper and 1.8 million in microfiche. This represents a 6 percent increase in paper and a 9 percent increase in microfiche copies over fiscal year 1989 sales levels. Total revenues of $29,114,000 represent a 19.5 percent increase over fiscal year 1989.

Also, during the year we issued 48 revenue-bearing patent licenses, and filed 100 inventions in foreign countries to protect overseas marketing rights for U.S. companies. The licensing program generated receipts of $6.4 million.

The Japanese Technical Literature Program—NTIS, in collaboration with the Technology Administration's Office of Technology Policy, continues to acquire and disseminate Japanese information.

Our Deputy Director, Doctor Clark, co-chairs the Task Force on Access to Scientific and Technical Information under the U.S./Japan Agreement on Cooperation in Research and Development in Science and Technology. The Task Force assembled a team of experts in machine translation, and in November, 1990, sponsored a study mission of the team to Japan. The study mission was conducted under the auspices of the National Science Foundation's Japan Technology Evaluation Center Program. The preliminary findings will be presented at the National Science Foundation sometime in March, and a full report will be published shortly thereafter.

NTIS and the Japan Information Center of Science and Technology will sponsor a joint conference here in Washington on April 2nd on access to Japanese scientific and technical information.

The Advisory Board—the Advisory Board required under the National Technical Information Act of 1988 is being established and is expected to hold its first meeting during 1991. A charter has been signed by the Assistant Secretary of Commerce for Administration and following the completion of the lengthy clearance process, NTIS, with Technology Administration leadership, reviewed the 23 nominations received. Recommendations for the selection of five members have been forwarded to the Secretary of Commerce.

The Inspector General (IG) conducted an audit of NTIS' financial statements for fiscal year 1989. The IG report identified problems in three areas—accounting, financial and modernization. In compliance with Departmental policy, NTIS has developed an audit action plan which specifically deals with each of the issues and recommendations contained in the report.

The report indicated that a major source of NTIS' accounting problems was the lack of adequate professional accounting staff, including an Associate Director for Financial Management. We are actively recruiting for the Associate Director, an Accounting Officer, and two Systems Accountants. The report also noted deficiencies in NTIS' accounting system. Many of the deficiencies noted by the audit were the result of the lack of an automated Accounts Payable system. We have already made automation improvements in this area which were fully operational during fiscal year 1990.

In addition, NTIS has made improvements in the following systems: inventory, revenue, labor, deposit accounts, ship and bill, and processing customer refunds. NTIS also contracted with an accounting consulting firm to evaluate the current accounting system and recommend ways to further improve it. Their final report was issued in December, and NTIS and the Department of Commerce are currently implementing some of the short-term recommendations made in the report.

The IG report questioned NTIS' authority to use deposit account funds to finance operations, cited inconsistency of cash flow, and questioned the timeliness and usefulness of financial reports. The Department is drafting legislation which will clarify NTIS' use of deposit account funds. The audit action plan details specific steps NTIS will take to improve cash flow and financial reporting.

Modernization—the IG report characterized NTIS' systems modernization plan as too general. As called for in the original plan, NTIS has obtained contractor assistance to determine customer needs, evaluate and recommend modernization initiatives, and produce a detailed plan. The contractor has completed several deliverables so far, and we expect the final planning document by the end of March.

In fiscal year 1990, financial statements have been audited by the firm of Peat Marwick. The results of that audit will be included in the Annual Report which you will receive shortly.

As stated earlier, contingent upon the availability of sales revenues, NTIS plans to expand the electronic storage and retrieval system, and replace the current input processing system.

The electronic storage and retrieval system will enhance the quality of technical report images while providing electronic archival storage of technical reports.

The new input processing system will replace the current standalone minicomputer system installed in 1974 and the terminals connected to the mainframe. This action is necessary because hardware and software support will terminate by the mid-1990s.

One final item that may be of interest to you is the fire in the electrical room of the Department's Office of Computer Services, a co-tenant with NTIS, in the privately-owned Sills Building on December 18, 1990. The fire was extinguished quickly by the Fairfax Fire Department, but because an electrical component in the room contained a PCB coolant, there was concern that PCBs or products of their combustion may have been released by the fire.

Extensive sampling of the air and surfaces throughout the building was undertaken. The sampling and subsequent analysis showed no evidence whatsoever of PCB release due to this fire, and employees were allowed to return to work on December 26th.

Further details on fiscal year 1990 are included in my statement submitted for the record, and additional information will be included in our Annual Report.

Thank you, Mr. Chairman. This concludes my remarks, and I will be happy to answer your questions.

[The prepared statement of Dr. Caponio follows:]

U.S. DEPARTMENT OF COMMERCE
PREPARED STATEMENT OF JOSEPH F. CAPONIO
DIRECTOR OF THE NATIONAL TECHNICAL INFORMATION SERVICE

Before the Subcommittee on
Technology and Competitiveness
Committee on Science, Space, and Technology
House
February 27, 1991

Mr. Chairman and Members of the Subcommittee, NTIS is not requesting appropriations for FY 1992 because we fund our operating expenses through the sale of our products and services. However, the FY 1992 President's Budget request includes language that will authorize NTIS to use up to $1,500,000 to fund modernization, contingent upon the availability of sales revenues. I would like to take this opportunity to present our accomplishments over the past year and other items of interest.

In FY 1990, NTIS:

- acquired and made available 60,000 new Government-sponsored technical reports including 1,500 Japanese and 20,000 other foreign reports. We will soon announce the addition of the two-millionth item into the NTIS collection which includes paper and microfiche reports, computer software and computerized data files on tape, diskette, and optical disk;
- sold approximately 400,000 copies of technical documents in paper and 1,800,000 in microfiche. This represents a six percent increase in paper and a nine percent increase in microfiche copies over FY 1989 sales levels. Total revenues

of $29,114,000 represent a 19.5 percent increase over FY 1989;

- issued 48 revenue-bearing patent licenses, and filed 100 inventions in foreign countries to protect overseas marketing rights for U.S. companies. The licensing program generated receipts of $6,400,000;
- helped Federal agency clients meet their information needs by producing CD-ROM discs through NTIS' new Electronic Media Production Service; and,
- became actively involved in Total Quality Management in our daily operations. Accomplishments now include:
    - a new telephone system that reduces time customers wait to place their order and also a self-direct feature that enables customers to route their call to the appropriate offices, and
    - redesigned work space by the Document Services Branch to allow for a smoother transmission of orders, and installation of new postal computers to ensure delivery in a timely manner.

Further details on FY 1990 will be included in our Annual Report that you will receive in the near future.

Japanese Technical Literature

New activities have resulted from NTIS' participation in meetings that support the provisions of the U.S./Japan Agreement on Cooperation in Research and Development in Science and Technology.

NTIS Deputy Director Dr. Joseph E. Clark co-chairs the Task Force on Access to Scientific and Technical Information under the Agreement. The Task Force assembled a team of experts in machine translation and, in November, 1990, sponsored a study mission of the team to Japan. The study mission was conducted under the auspices of the National Science Foundation's (NSF) Japan Technology Evaluation Center (JTEC) program. The team will present its preliminary findings at NSF in March, and publish a full report shortly thereafter.

At their first meeting in 1989, members of the Task Force identified a significant impediment to U.S. acquisition of Japanese scientific and technical information: Japan has no centralized system to grant either reproduction or translation rights for copyrighted information.

In December, 1990, the Copyright Council of Academic Societies of Japan established a program which will centralize clearance for scientific and technical documents. This program is titled the Japan Academic Societies System for Copyright Clearance (JASC). Bylaws and a business address have been established for the JASC.

A number of Japanese government and private sector organizations are working to establish the Japan Reprographic Right Center (JRRC) in April, 1991. The Task Force continues to urge the Japanese Government to help accelerate these efforts for establishment of the JRRC. Ultimately, we expect to see a Center similar to those in other industrialized nations, such as the U.S. Copyright Clearance Center.

There will be a joint conference on access to Japanese scientific and technical information sponsored by NTIS and the Japan Information Center of Science and Technology (JICST), an agency of the Japanese Prime Minister's office. The conference will be held here in Washington on April 2. The Japanese Technical Literature Program of the Technology Administration has funded a training manual which will be based on conference content and will be sold by NTIS.

NTIS, in collaboration with the Technology Administration's Office of Technology Policy, continues to acquire and disseminate Japanese information. NTIS has formal agreements with 70 significant Japanese information sources which permit distribution of their technical publications in the United States. We also offer on-line access to some of the major Japanese science and technology databases. These are the databases which comprise the JICST Online Information Service (JOIS) which offer citations to articles appearing in about 7,000 Japanese science and technology periodicals.

Advisory Board

The Advisory Board required under the National Technical Information Act of 1988 is being established and is expected to hold its first meeting during 1991. A charter, required under the Federal Advisory Committee Act (5 U.S.C. App. 2), was signed by the Assistant Secretary of Commerce for Administration in September, 1989. Following the solicitation of recommendations for membership on the Advisory Board in the Federal Register, 23 nominations were received. Following the completion of the lengthy clearance process, NTIS reviewed the nominations with Technology Administration leadership, using the criteria for technical competence and balanced representation of the user community and geographical areas of the United States, and forwarded recommendations for the selection of five members to the Secretary of Commerce.

Financial Statement Audit

The Inspector General (IG) conducted an audit of NTIS' financial statements for FY 1989. The IG report identified problems in three areas--accounting, financial and modernization. In compliance with Departmental policy, NTIS has developed an audit action plan which specifically deals with each of the issues and recommendations contained in the report.

- Accounting

  The report indicated that a major source of NTIS' accounting problems was the lack of adequate professional accounting staff, including an Associate Director for Financial Management. We are actively recruiting for the Associate Director, an Accounting Officer and two Systems Accountants. The report also noted deficiencies in NTIS' accounting system. Many of the deficiencies noted by the audit were the result of the lack of an automated Accounts Payable system. We have already made automation improvements in this area which were fully operational during FY 1990. In addition, NTIS has made improvements in the following systems: inventory, revenue, labor, deposit accounts, ship and bill, and processing of customer refunds. NTIS also contracted with an accounting consulting firm to evaluate the current accounting system and recommend ways to further improve it. Their final report was issued in December, and NTIS and the Department are currently implementing some short-term recommendations made in the report. NTIS and the Department, working together, are making many other improvements that will put us on a sound financial system footing.

- Financial

The IG report questioned NTIS' authority to use deposit account funds to finance operations, cited inconsistency of cash flow, and questioned the timeliness and usefulness of financial reports. The Department is drafting legislation which will clarify NTIS' use of deposit account funds. The audit action plan details specific steps NTIS will take to improve cash flow and financial reporting.

- Modernization

The IG report characterized NTIS' systems modernization plan as too general. As called for in the original plan, NTIS has obtained contractor assistance to determine customer needs, evaluate and recommend modernization initiatives, and produce a detailed plan. The contractor has completed several deliverables so far, and we expect the final planning document by the end of March.

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Modernization

As stated earlier, contingent upon the availability of sales revenues, NTIS plans to expand the electronic storage and retrieval system, and replace the current input processing system.

The electronic storage and retrieval system will enhance the quality of technical report images while providing electronic archival storage of technical reports. The new input processing system will replace the current stand-alone minicomputer system installed in 1974 and the terminals on-line to the mainframe. This action is necessary because hardware and software support will terminate by the mid-nineties for this data input minicomputer.

Fire at NTIS

One final item that may be of interest to you is the fire in the electrical room of the Department's Office of Computer Services, a co-tenant with NTIS, in the privately-owned Sills Building on December 18, 1990. The fire was extinguished quickly by the Fairfax Fire Department, but because an electrical component in the room contained a PCD coolant, there was concern that PCBs or products of their combustion may have been released by the fire.

Extensive sampling of the air and surfaces throughout the building was undertaken. The sampling and subsequent analysis were conducted independently by two experienced and competent laboratories, and as a further check and balance, NTIS hired a consultant to give an independent third party review of the on-site monitoring and the sampling process and review of the reports. The results showed no evidence whatsoever of PCB release due to this fire. In fact, no definitive conclusions can be drawn from the low levels of PCBs in the electrical room being due to the fire since these levels are within the range of background levels normally encountered. Employees were allowed to return to work on December 26.

A removal and cleanup proposal has been presented to the vendor who installed and maintained the frequency converter which was damaged by the fire.

Thank you. This concludes my statement.

QUESTIONS FOR THE DEPARTMENT OF COMMERCE TECHNOLOGY ADMINISTRATION FY 1992 AUTHORIZATION HEARING

NTIS Questions

1) Modernization:

A) Grant-Thornton has conducted a Financial Systems Strategy Study for NTIS.

i) Do you plan to implement that study in FY 1991? Is this plan to be used as a blueprint for your financial systems reform or do you plan to vary significantly from it?

Initial improvements to the system were made in FY 1990 (e.g., Accounts Payable System). In FY 1991, we have continued to make some system improvements, while awaiting the Grant-Thornton report and while beginning to work with the Department's new Chief Financial Officer (CFO). Recently, we have been reviewing the Grant-Thornton report with the Department's CFO to identify short term options for improving the NTIS financial systems. Longer term solutions for NTIS will be considered as part of the Department's overall strategies for implementing a consolidated financial system for all DoC component organizations.

ii) The plan will cost at least $290,000 in FY 1991 and $315,000 in FY 1992. Where will the money come from?

Until we have completed our consultations with the Department, we do not have a firm fix on the actions we will take or the costs for these actions. Any improvements in NTIS' financial systems will have to be funded from sales revenues.

iii) The plan is described as a short-term solution until the Department of Commerce institutes a Department-wide financial system. To what extent could it be used as a pilot project for such a system with the Department benefiting from what you learn and NTIS having to scrap its financial controls later on?

As described above, the Department is assisting NTIS in identifying some short term options while including NTIS in all planning sessions and discussions concerning the Departmental financial systems. The DoC system will be the system that will address the longer term needs for all bureaus including NTIS.

iv) Is there provision for review and upgrade of the plan? When would this take place? If no, how will NTIS stay current other than implementing auditor's annual suggestions?

As part of DoC financial system, NTIS will benefit from future reviews and upgrades of that integrated system.

v) Will these changes lead to different skills being required of your workforce? How is this being handled?

Beyond some systems accounting, we do not expect different skills to be required. When hired, the Associate Director for Financial Management will evaluate all financial staff needs to determine any other changes that might be necessary.

B) Are other modernization efforts postponed until financial restructuring is complete? If money were no object, what is the maximum modernization effort which could be undertaken in 1992?

The Inspector General has recommended that the technical report portion of our Electronic Documents System be postponed, possibly until the mid-1990's. The maximum modernization effort which could be undertaken in 1992 includes:

- o engaging the services of an expert systems integrator to ensure that all modernization initiatives are properly coordinated and taking advantage of the "best" technologies;
- o implementing a new Input Processing System;
- o expanding the Electronic Document System;
- o converting computer mainframe applications to use the Customer Information Control System (CICS);
- o designing and beginning implementation of a Management Information System; and,
- o expanding the application of bar coding technology in handling documents.

2) **NTIS Finances:**

A) Concern has been raised about the propriety of using NTIS deposit accounts as source of working capital. When is this matter likely to be resolved?

We are working with the Department to develop legislation which will clarify NTIS' use of deposit funds.

B) The Department's Inspector General has stated that NTIS has several money-losing operations. Has he been clear on what they might be? Are the losses reversible? If not, should the operations be continued and how should they be subsidized?

All NTIS products recover the direct costs associated with production and distribution. The losing operations the IG has referred to are cost centers that NTIS has established to record and report financial data for support functions such as acquisition of foreign materials, including Japanese.

These costs are legitimate costs necessary to support other self-supporting products and services of NTIS. They contribute to revenue generation of these products and services and the revenue has, for reporting purposes, been recorded in these products. In FY 1990, NTIS allocated these costs to all existing products on a fair and equitable basis.

C) Some concerns have been raised that DIALOG's charges for searching NTIS databases has risen rapidly and that NTIS has required these increases. If this is true, is the pricing structure hurting sales volume because it is cheaper to use other databases? Would lower prices increase use?

Over the years, NTIS has modestly raised the price of the NTIS Bibliographic Database (NBD) commensurate with its mandate for cost recovery and in line with other database producers. Traditionally, DIALOG and other vendors mark up price increases by 50-100% and pass them along to end-users of the on-line system. In 1989, DIALOG substantially increased the price of the NBD to end-users. The price increase to end-users was not in line with our increase.

Over the last five years, NTIS and other database producers have seen a leveling off of connect-time to databases accessed through on-line vendors. Price increases and technology improvements may have had an impact on this decline. Faster modems, microcomputers and software that enable you to compose your search off-line are but a few of the improvements. Another factor which may have an impact on on-line usage is CD-ROM. The NBD is available on CD-ROM from three different vendors. Sales of NBD CD-ROMs have caused some shifting of usage from on-line to CD-ROM. In general, the NBD is priced about the same as comparable private sector databases by the various on-line vendors. We do not have any evidence that a lower price for the NBD would increase use.

D) Has any study ever been made of the social costs of making NTIS pay its own way? Are other information services subsidized by their governments?

A study has not been made of the social costs of making NTIS pay its own way.

To the best of our knowledge, there is not another information services government organization which is 100% cost recovered. Examples in the Federal Government of organizations that are subsidized are: the Government Printing Office (GPO), the Department of Defense's Defense Technical Information Center (DTIC), the Department of Energy's Office of Scientific and Technical Information (OSTI), and the National Aeronautics and Space Administration's (NASA) Scientific and Technical Information Division. To the best of our knowledge all foreign government information service organizations, such as Japan Information Center of Science and Technology (JICST), Canada Institute for Science and Technology (CISTI), and Germany's FIZ are subsidized.

3) Marketing:

A) What is the status of NTIS joint ventures?

During Fiscal Year 1990, NTIS responded to inquiries from more than 20 organizations, and evaluated 10 joint venture proposals, resulting in four new joint ventures. As of February 22, NTIS was actively involved in 12 joint ventures, four with universities, two with associations, and six with private companies. Additionally, in conjunction with potential partners, NTIS is currently evaluating the business and mission implications of seven new joint ventures.

During the past year, NTIS developed internal procedures to manage the program and produced a Joint Ventures Guideline pamphlet to provide to prospective partners. Moreover, on February 8, 1991, NTIS published a notice in the Federal Register describing the program in more detail and soliciting inquiries from private organizations.

B) Are you contracting out work in the manufacturing area?

We use outside contractor services for a number of marketing operations. These include:

- o the assistance of various list brokers in the selection of lists that will maximize our efforts to reach specific market niches at the lowest possible cost;
- o our Special Outreach Program for science and technology and business editors, for years, has been done through outside announcement services; and,
- o we are currently seeking to engage a contractor to assist us in the development of new innovative promotion copy generation for the promotion efforts of some of our most popular products and services.

C) Does NTIS have an overall manufacturing plan? How do you plan to achieve NTIS's goal of increasing sales? Do you know of missed markets?

Strategic and financial plans for NTIS include marketing. As part of our annual planning cycle, we develop promotion and exhibit plans. Our overall marketing plan centers on acquiring more of the material in which our customers have shown an interest; on improving our ability to promote the availability of this material; and, on providing high quality service to our customers. We have made recent efforts to better identify and more actively acquire some "best seller" technical material. We are investing in the market research that is necessary to improve the targeting of our promotion efforts. And we have made substantial process improvements designed to help us deliver the right product in a more timely manner.

We believe this combination of a more active acquisitions program, a more targeted promotional effort, and improved service delivery will provide the foundation for increasing NTIS sales.

We have not knowingly "missed" any market where we believe that the cost of promoting to that market is less than the sales we would expect to earn. If you were to look at the degree of NTIS market penetration in each Standard Industrial Classification (SIC) 4 digit area, you would find some degree of penetration in each. However we are sure that we miss some niches that are found in the six and eight digit SIC levels. The ability to attempt to reach those is a function of our ability to identify their characteristics as a market.

D) How can on-line capabilities be used to increase NTIS sales? Do you cooperate with GPO in marketing? Is information on NTIS products available at GPO stores? Can a potential NTIS customer order NTIS materials at a GPO store?

We were one of the first half-dozen data bases in the country to use commercial on-line services to promote and sell our products and services. Today, we use several commercial on-line vendors. We count on each vendors' own marketing and our own promotion to increase our on-line sales growth. Clearly, the addition of bulletin boards and other vendors, such as Compuserve, the Source, Genie and others, might increase sales.

From time to time, the Government Printing Office (GPO) and NTIS have cooperated in the cooperative promotion of goods and services. Our experience has been that these activities have not reached expectations. Markets are quite different. GPO has a 15,000 title product line that, in general, has broad interest. NTIS, in contrast, has over 2,000,000 titles that are very narrowly focused in the STI business-to-business market. In this market, a sale of 10 copies of any one title is considered quite good. Recently, GPO and NTIS have been examining how we can both sell our products and services in a joint GPO/NTIS bookstore.

E) Have you ever tried having access to NTIS materials through the special order desks of commercial bookstores? Through college bookstores? Thru technical publishers? If desirable, could a private sector company place a surcharge or a handling fee on NTIS products to cover their costs in marketing them?

NTIS has not tried these specific examples. It is possible for a private sector company to institute a fee on NTIS products to cover their costs in marketing them.

4) **FEDRIP:**

A) What is the status of FEDRIP and what is being done to improve input to the system?

We have made considerable progress in making improvements to the FEDRIP Database. We have increased agency participation by adding the Small Business Administration's (SBA) Small Business Innovation Research (SBIR) data, and we now have complete coverage from the National Science Foundation (NSF). The frequency of input has improved from semi-annual to monthly. Recently an interagency working group was established and a FEDRIP users meeting was held on February 6, 1991. We are currently following up on their recommendations and developing an action plan. A significant outcome of the meeting is the commitment by EPA to contribute to FEDRIP.

B) What plans do you have for increasing its use?

Although overall usage of FEDRIP does not come near to the usage of the NTIS Bibliographic Database, usage of the FEDRIP Database has doubled over the past two years. We have worked closely with DIALOG, the sole on-line vendor for FEDRIP, to promote on-line usage. We have advertised FEDRIP in trade journals and other media and will continue to do so. We have also conducted training classes on how to access FEDRIP online.

Mr. **Valentine**. Doctor Lyons, do you still have that herd of deer out there?

Dr. **Lyons**. Not only do we have a herd of deer, but we have a couple thousand Canadian geese, so you can take your pick.

Mr. **Valentine**. You, of course, are exempt from the restrictive regulations concerning harvesting which affect other humans. In other words, can we go out there and shoot some of them?

Dr. **Lyons**. You can, sir.

Mr. **Valentine**. Doctor Lyons, before I go on to a few questions of you and the others, I want to be sure to ask you about this. We propose to reintroduce the American Technology Preeminence Act in the immediate future. I would appreciate it very much—we would appreciate it if you, and also the others, would examine that proposed legislation in the form it existed last Congress—if you don't have access to it, let us know and we'll get you a copy—to give us your judgment in any way you deem appropriate—directly, formally, informally, privately, whisper in the ear, or anything you want to do with that so that we can have a clear understanding as to what things you think we have in there that might not be added. We're serious about it and we want to go ahead and get that in and try to get it passed. As far as I'm concerned, that's what's called standing on the shoulders of giants.

I will have appropriated all that stuff that other members have introduced here. We're going to put it into one piece of legislation. We would like to have your views on that.

How would you characterize, Doctor Lyons, the relationship over the past year between technology-based industry and NIST?

Dr. **Lyons**. Yes, Mr. Chairman, before I answer that question, may I note that on March 11th the subcommittee is proposing to come visit us at NIST. I think you have some arrangements in the works. I just want to add my emphasis— extend our invitation and welcome to the members of the subcommittee and hope that you can come and join us. Some of you have been out before—you have, Mr. Chairman, but we'd be delighted to have as many members of the subcommittee that can break away and come see us.

Ms. **Morella**. Mr. Chairman?

Mr. **Valentine**. Yes.

Ms. **Morella**. I just wanted to echo that invitation to invite all of you to come out to NIST. We sent the invitation out. I'm very proud of NIST and again want to welcome Doctor Lyons and indicate that I'm very proud that NIST is in the district that I represent.

Mr. **Ritter**. I was wondering if we could hunt some of those 2,000 geese, during the season of course.

Mr. **Valentine**. All of you bring your guns. We can't furnish shot guns or anything like that.

Seriously, we enjoyed our visit last year. That is quite an institution, quite an impressive plant, and I would urge all the members of the subcommittee to avail themselves of that opportunity either at this invitation or under the guidance of our distinguished colleague in whose district the facility is located or at any other time.

Dr. **Lyons**. For those of you that come, you will hear the story of my discussion with Secretary Lujan about how to deal with deer and geese. Amusing but not very constructive story.

The question was, How are we doing with regards to technology-based industry, particularly in the last year.

First, let me observe that from the beginning, from 1901, the National Bureau of Standards was charged by the Congress with helping and supporting industry. In those days it was a technology-based industry that we concentrated on, namely the electrical industry that was just coming to maturity at the turn of the century.

The 1988 legislation reemphasized the role in support of industry perhaps as opposed to some other roles that we have been given over the years and refocused us very strongly on helping American industry compete in the world market. That was in 1988.

Last year, and in the current year, we have been implementing some of the new authorities and also strengthening our laboratory programs. We had a good budget year last year, so we were able to increase some of our efforts in relation to the electronics industry, the information industry, and the materials industry, and manufacturing. As you will note, our current budget for 1992 emphasizes the same areas, as I think it will in the future.

We have had the competition for the first round of Advanced Technology grants. This is in direct relationship with the technology-based industry. As I said in my statement, we had a very large number of grant proposals, 250, most of them good, and many of them outstanding. We've just finished sifting through those in a very rigorous procurement process and we'll be announcing the winners in a matter of a week or two.

The Manufacturing Technology Centers which reach out to tech-based industries in the States, the three that we have are running well. We're just finishing up a competition to award two more, and we'll be doing that within the month.

We have more people working at NIST in our laboratories from industry than ever before—a couple hundred industrial research associates—and we have a large number of formal agreements—I think second only to NIH—and for our size we probably have more cooperative R&D agreements than any other Federal laboratory.

So I would characterize relationships with industry as always having been good, but better than ever now.

Mr. VALENTINE. We continue to hear that NIST facilities are seriously in need of repair. In view of this, in your opinion, the $4 million that is earmarked for that purpose in the Administration's budget—is that adequate? Or is that just the beginning?

Dr. LYONS. I think it's just the beginning. There is agreed with OMB a schedule of requests for facilities in the safety and system capacity area. So we'll be looking at things like sprinklers, and smoke detectors, and fire alarms, and so on, which are hopelessly out of date, obsolete, some of them malfunctioning too frequently. So we need to replace those systems.

We have problems with cooling water capacity and the like that have to be addressed and this $4 million is the first of a sequence of efforts to correct those problems. We are, at the same time, making an architectural and engineering study of both the Gaithersburg and Boulder facilities to see whether or not the facilities are adequate for the new advanced technical work that we do. We have anecdotal evidence that says that the facilities are not adequate for some of the most demanding work in terms of environmental quality and control, cleanliness of air and the like.

Also, there will be a matter of whether or not we can house the expanded staff. This budget that we're proposing has I think 230 new positions authorized. That's going to stretch our physical capacity to handle staff.

So the ANE firm is looking at all of these questions and will report by mid-summer—so actually before this cycle is over the Congress will have available some information on that that we don't now have.

Mr. VALENTINE. Yesterday, Doctor Bement, who is chairman of the Visiting Committee said, as we understood it, that he thought that NIST could become preeminent in commercial technology if the Federal Government provided the necessary resources. Could you give us your judgment, Doctor Lyons, as to what it would take to achieve that objective? Would the Administration's proposed doubling of NIST's budget over the next five years achieve that objective, or approach it?

Dr. LYONS. We're delighted with the present statement in the big budget book which talks about projecting a rate of increase of resource that would double NIST in about five years. Our budget history is that in real dollars we've been dead flat since the late 1960s, and we've always had zero increases in our out year projections, so we've never been able to talk about or plan for increases. With this statement we have a very different planning environment. We're very encouraged by that.

It's very hard to tell what industry will need in five years, but I certainly think that the current projected rate of growth of doubling by 1996 is a handsome budget guidance. I think it will be adequate. As I said, we'll have to see how industry's demands develop.

Mr. VALENTINE. What—let me—this is not really a question before us today, but we'll get to it later on. How many people do you have out there working on the Baldrige Awards, approximately?

Dr. LYONS. Between five and ten. I can't give you an exact count, but we can get back to you with that number.

The National Institute of Standards and Technology's Office of Quality Programs currently has 11 full-time permanent employees.

Mr. VALENTINE. Were you surprised at the attitude, the reception that that program has met with?

Dr. LYONS. Yes, sir. We have a bear by the tail. There is no question about that.

Mr. VALENTINE. Ms. Wince-Smith, the initial reports about the implementation of the Metric Usage Act seemed to indicate that compliance is proceeding very slowly if at all. What plans do you have in your office to help implement the legislation, and do you have sufficient funds? What else can you tell us about the perceived problems in that area?

Ms. WINCE-SMITH. Thank you, Mr. Chairman.

Well, I believe we're making very significant progress in the metric conversion within the United States Government. There is no question that the hearing that was held last April was a very positive step in that direction.

Let me mention a couple of things that are underway and highlight some of the specific initiatives in the Government to demonstrate this.

We have just recently issued, in the Federal Register, our revised metric conversion policy. It makes a very important significant change, that is that it's going to require Federal agencies to lead the way in metric usage and assist the businesses that they deal with in their normal client relationship, so that in effect you're going to be having all the agencies and departments of the Government not only engaging in their own metric activities, but working with their constituencies in the private sector to encourage them to voluntary convert to metric units.

The Federal acquisition regulation system has also been revised to include a notification requiring agencies to use the metric system. This is a very important development as well because it requires agencies to use the metric in developing specifications and product descriptions of Federal procurements.

Major Federal purchasing agencies have declared the decision to buy metric. GSA is in the forefront of that. NASA, as I think many of you are aware, has issued a directive that after October 1st of last year all their flight systems will be designed in metric. So there are many things going on in that respect.

In terms of what Commerce is doing, we have taken our responsibilities very seriously, both as regards our internal process towards going metric—we have an interagency group at the Assistant Secretary level. We are making progress in terms of the Census, BXA, all our operating units. What we have also done is accelerate the number of meetings and high level attention we are giving to metric through the Under Secretary's Interagency Council on Metric Usage.

I mentioned in my oral statement that in terms of industry outreach, we are using the metric challenge and fitting it into all the activities of the Department through our domestic and foreign commercial service as well as the National Export Promotion Program. I would be pleased to provide for the record a more comprehensive documentation of these activities.

[Material referred to follows:]

FURTHER AMPLIFICATION ON FEDERAL METRIC USAGE ACTIVITIES

I have mentioned industry metric usage outreach carried out through the U.S. and Foreign Commercial Service and our National Export Initiative Conference Program. An increasing tempo of outreach is carried out by all Commerce agencies as outlined in this year's Department of Commerce report to this Committee. Rather than limit discussion to Commerce outreach, I would like to give the Committee a brief overview of the outreach which is associated with the overall Federal implementation of metric usage.

A number of the Interagency Council on Metric Policy (ICMP) agencies have begun new initiatives for metric usage. This year's agency progress reports will provide some specific details. The reports are submitted directly to Congress, but our Office of Metric Programs will be reviewing them and we will provide an overview, on behalf of the ICMP, to this Committee.

The major ICMP departments and agencies are approaching metrication on an evolutionary replacement basis. For example, new NASA flight programs and new DoD weapon systems will be metric. But these new starts of systems and equipment designed specifically for government use represent a small portion of on-going procurements, or for that matter of the total use of measurement units in Federal agency measurement sensitive activities.

Although Federal agencies are large users of commercial products, the portion of industry output purchased is small– on the order of 3-5%, and current procurement regulations encourage federal use of commercial specifications and purchase of standard commercial products.

It is easy to suggest that Federal demand for metric will evoke a corresponding response from the private sector, but this is not what experience shows. Good suppliers, some of whom are not particularly interested in responding to Federal requirements, may simply not bid, leaving agencies with no bids or lower quality suppliers.

Metric usage initiatives by Federal agencies in areas outside of contracts are increasing in response to the metric usage mandate. The National Science Foundation, for example, now requires all grant applications to use metric units. In areas that are not as metric as in science, however, the challenge is for effective Federal outreach and consultation to bring about voluntary public and private sector transition to metric usage.

There is great merit in sharing agency experiences in both the planning and administration of metric usage implementation. The ICMP and its subordinate committees are doing just that, but it is clear that the general awareness level of our efforts, and recognition of the economic necessity for national metric transition is not as high as it must be in both public and private sectors. This suggests that much more needs to be done to focus attention on the issue. We believe that an Executive Order would certainly provide encouragement to government, and industry, to proceed with this important improvement to our national competitiveness.

Should an Executive Order be signed, we will embark on more direct outreach to U.S. industry and commerce. What we will propose to the Federal agencies is establishment of specific lead agency assignments to cover the spectrum of products, services and activities with which the agencies deal. The lead agencies will be asked to invite their suppliers and clients to accept the challenge of seeking the economic benefits of metric (or avoiding the economic peril of inaction) and set achievable objectives and dates for their accomplishment. Proceeding in this way, we believe the private sector can be persuaded to respond positively and in consonance with the metric usage leadership provided by the Federal agencies as they carry out the federal metric usage leadership mandate. We will need and therefore seek the full participation of state and local governments, which are not directly affected by the metric usage provisions.

Mr. **Valentine**. We would appreciate that very much if you would do that.

Can you—in a few words—tell us the status of the Japanese Technical Literature Program in terms of staffing?

Ms. **Wince-Smith**. We have, as of last year, hired a new Director of the Japanese Technical Literature Program, Doctor Phyllis Genther, who is a very qualified individual. She has a Ph.D. in this area, speaks fluent Japanese. We also have a full-time contractor expert in Japanese language as well, and we have a new office director in International Technology Policy and Programs who is also engaged on Japanese technical literature activities as well as the broader international technology issues pertaining to Japan and other parts of the world.

We have not—because of resource constraints—been able to move forward with the legislative requirement to place a Japanese Technical Literature officer in Japan. I might add here that devoting $400,000 in fiscal year 1992 to JTL is a very significant amount of my resources. To place an individual in Tokyo, we estimate the cost to be well over $400,000. In addition to that, we have very severe ceilings on the number of individuals overseas at our embassies. So there are many, many constraints on that that have made it impossible for us to move on that. That's not because we don't have a desire. We have real limitations to proceed on that.

Mr. **Valentine**. Is there anywhere in the Federal Government a German or Swedish Technical Literature Program?

Ms. **Wince-Smith**. Not that I'm aware of, although NTIS, and perhaps Doctor Caponio would comment on that. They acquire tremendous amounts of foreign scientific literature. Much of that comes in English versions as well. Perhaps he might address that.

Mr. **Valentine**. I was going to ask him that, too.

Is the reason that there are more people who are able to speak and understand German and other languages—what would you say about that?

Dr. **Caponio**. Mr. Chairman, NTIS over the years has developed several bilateral agreements with countries and in particular Germany. We have a very active agreement with the United Republic of Germany to exchange scientific and technical information. We also have a very active program with the Japanese Center for Science and Technical Information as well as with most of the developed countries, including the U.K., France, Canada, and throughout the world.

So we make a determined effort to acquire foreign technical information and we announce the availability of such information through the various media that NTIS produces.

Mr. **Valentine**. Doctor Caponio, yesterday one of the witnesses had some things to say that were less than complimentary—not about you and nothing personal—but about some of your equipment. Were you here to listen to that?

Dr. **Caponio**. No, Mr. Chairman, I wasn't, but I suspect that I can anticipate both the question and the criticisms that have been leveled by the community at large. Unquestionably, we do operate within a certain antiquated mold in many respects. For example, as I mentioned in my statement, we're attempting to rectify many of the areas that certainly require modernization. The input system, for example, was developed in the mid-1960s, and I would dare say that within the mid-1990s much of that equipment will be obsolete.

So we are in the process of attempting to modernize not only the input systems but even going beyond. As you probably know, Mr. Chairman, the trend today is for electronic storage and distribution. It's the application of the most recent information technologies, and in particular the utilization of optical disc technology for the storage and transmission.

So we're embarking on a modernization effort. As you well know, any modernization effort requires funding, and we're hoping to be able to fund these through the availability of funds that we would obtain through the sale of our information services and products. Absent this particular source of funding, we would have to defer modernization efforts, or seek other sources of funding.

Mr. **Valentine**. Well, it seems to me that that represents a bottle-neck and is an area that should be addressed forthwith by the Congress. If you're talking about moving out into private sector information that has been gleaned by the Federal Government that ought to be one of the priorities that we have. We have $1.5 million in this preeminence bill—if you had all the money you need—I can't bring myself to say that—but if you had a lot of money—

Dr. **Caponio**. That $1.5 million that has been requested and is contingent on the availability of funds would take care of the initiation of all of our current modernization efforts. I might also add that we are working in concert with many of the other Federal Government information services to develop additional modernization activities.

Mr. **Valentine**. Ms. Morella, I take the liberty of recognizing you, since you got in here late. We skipped over that because the dear lady didn't get here in time to make her opening statement.

Ms. **Morella**. Thank you. I promise that I will be very brief.

Again, I just want to reiterate my welcome to NIST and to indicate that I'm really very pleased that the President has demonstrated his commitment with a 15 percent increase in the commitment—of the willingness over the next five years to double it. I wanted to again invite everybody—a letter will be sent to all the members and their staffs—to join us on March 11th. I understand you're going to have lunch for us at NIST.

And I was going to comment on EC-92 and ask you to elaborate on what you're also doing to help businesses with regard to preparation in terms of expanding a database.

But I will let Mr. Ritter ask his question, and I'll have my statement in the record. I look forward to discussing it with you all personally.

Thank you, Mr. Chairman. I appreciate it.

Mr. **Valentine**. Mr. Ritter.

Mr. **Ritter**. Thank you, Mr. Chairman. I appreciate you recognizing me.

I have a line of questioning that relates to what appears to be a new mission or an added mission or an expanded mission for NIST to be the kind of front-end of a new Federal policy which is a little more willing to engage in the evolution and development of technology, particularly in the precompetitive stage. Many of us have—

and if you look at the comments of Doctor Bement yesterday, referring to Alan Bromley's OSTP pronouncement, it is appropriate for the Federal Government to be engaging in the evolution and the development of technology — I'm paraphrasing—in the so-called precompetitive stage, which we all agree here was a departure from the past, a landmark shift of gears, and frankly on this committee and subcommittee it met with substantial approval.

So given all of this, what kind of relationship is NIST, as the cutting edge of the implementation of this idea—what kind of relationship does NIST maintain with Doctor Bromley, with the OSTP, and how do you now see yourselves as coordinating with in the various turf locations within the Federal agency R&D responsibility.

Doctor Lyons, do you want to take a crack at that?

D. LYONS. Yes, Mr. Ritter.

We are in regular communication with OSTP, both with Dr. Bromley and with the next echelon of Associate Directors, and in particular Dr. Bill Phillips who worries about technology and industry as his area of expertise.

There are also the FCCSET committees on which we serve. I'm a member of the Committee on Industry and Technology, which is—

Mr. RITTER. What's sort of the format for OSTP and NIST to kind of share what they're doing and where they're going? I know you're in touch, but what does that mean more specifically?

Dr. LYONS. I think it means mostly informal discussions, telephone conversations. My associate, Deborah Wince-Smith, does the same thing. We are in almost daily contact with OSTP. I have, for example, a staff member who is at OSTP.

So it's my sense that we have developed some of these ideas together. Let me just give one example, and perhaps Deborah would like to elaborate on it. The phrase that you hear now of generic and precompetitive technology, which is now embedded in the blue-covered United States Technology Policy Document, was in fact first arrived at in developing the rule for ATP. Any number of us in the technology administration were involved in that activity with OMB, as a matter of fact.

Finally that appeared in the ATP rule and began to appear in discussions from Doctor Bromley and his associates and indeed made it into a well-known speech the President gave to the American Electronics Association about a year ago.

So one aspect is just that kind of conversation. I think to try—it wasn't formal how we arrived at that phrase.

Mr. RITTER. How often does FCCSET meet?

Dr. LYONS. FCCSET meets in a variety of ways. The actual FCCSET Committee itself meets rather infrequently and is composed of cabinet rank people. But the various committees of FCCSET, like the one I mentioned on industry and —

Mr. RITTER. How often does that meet?

Dr. LYONS. That meets about every 60 days, and then it has subcommittees working on topics such as materials. It meets regularly, both formally and informally and is now engaged in looking at the Federal R&D effort, inventorying it, and thinking about what to do next.

The FCCSET Committee mechanism is one that Dr. Bromley is very keen about and talks about a lot in public pronouncements.

So I think the relationship is becoming almost pervasive. For awhile, in the last years of the 1980s, FCCSET was very close to death.

Mr. RITTER. There have been a lot of people who have been involved in this issue over time who feel that the Federal R&D economy is extraordinarily fragmented. We applaud Dr. Bromley's efforts to fix it with FCCSET, to bring back some kind of cohesion so the right hands know what the left hands are doing.

I would urge that OSTP and NIST are real close as we get into this new era.

I had some questions about the commitment of NIST to the manufacturing programs, including the centers.

How do you see—I guess—when Eric Bloch testified a couple or three years ago, he was stating—they put it all together and the commitment to manufacturing in the National Science Foundation budget, which was pushing toward $2 billion — it was something like $48 million. As we know, three decades, four decades—manufacturing was not exactly the favored child of Federal R&D and technology economy.

Are we really strengthening our ability to make "Made in America" once again the label of choice? Is NIST really moving forward on a variety of fronts?

Dr. LYONS. We're certainly working on it. In most of our program areas in the laboratory itself—setting aside the manufacturing technology centers and other special activities. If you look into our programs—again, let me talk about materials because I think we can communicate probably most efficiently on materials—going back some years we began to shift emphasis away from properties of materials to key parameters of processing. We're now beginning to use the phrase "materials synthesis and processing" as kind of an overall label for the category.

The same is true in our chemistry program. We created a program in chemical engineering and began to work on what we thought were critical barriers to improving process efficiency and quality.

You know about our factory automation program which was deliberately aimed at the application of computers and microprocessors to the factory floor. In electronics, we did the same thing. Our measurements on semiconductors are increasingly aimed at the factory measurement rather than the laboratory research person.

So rather deliberately over a long period of time, we have shifted our own emphasis into manufacturing. Those are two of the three problems we have in competitiveness.

Mr. RITTER. I would like to encourage that trend, and I think the Chairman and other members of this subcommittee and committee—we feel the pressure back home with foreign imports breaking into many times heretofore impregnable American industries and companies.

Also, we had a focus in the ATP authorization on high resolution information systems. The subcommittee, as it was time—SRT—and then the full Committee, under the leadership of George Brown and the Chairman himself, we tried to look to this to have some kind of capability, at least in the Federal R&D economy that dealt with this whole emerging area of high definition—television and all the activities that extend beyond that.

How do you see that playing out? I know the authorization only made it through the House. We're about to reauthorize, and I assume that language will be in there in a similar fashion. How do you see that playing out in the current round of ATP funding?

Dr. Lyons. Let me skirt around what I know about the winners because I don't want to reveal something before we get final approval. First of all, looking a little further into the future, I fully expect that proposals to ATP will come from those areas that are called out in our emerging technology reports and in the critical technology report that's about to come out in a couple of weeks. The last draft of that is in review now in my shop, for example.

On everybody's list is advanced telecommunications, advanced information processing, wide band width for communications, and always somewhere in there is the high resolution aspect of that because that's really what we mean by the high band width.

In the current round of ATP, we had proposals in those areas, so we may have winners in those areas.

I think the system which we set up in the first round of ATP and in the 1988 legislation did not call out areas. In fact, in early drafts of the trade bill there were, for example—and then I think advanced imaging was one of those.

Mr. Ritter. Exactly. It's a little less program specific in the actual bill, but we felt we could handle some of those thoughts in report language.

One last question—Secretary Wince-Smith, you mentioned the technology policy operation seeking to further teams—I think that's a great idea, by the way. If you see where the Japanese have really taken us to the cleaners, they are consistently, year after year, month after month, constantly coming up with a team approach, and largely in that precompetitive stage, I might add. They get over those technological hurdles, then they beat the heck out of each other and the rest of the world.

But we're so new at this.

I have one question here. Does the existing Federal law on antitrust violation impede your efforts to create these teams? You still have people out in industry who don't want to touch these things with a 10-foot pole because they feel they can get socked even with the Cooperative Research Act, that there's a whole range of places where they can get hit and hauled into court and all of the above. What are your thoughts there?

Ms. Wince-Smith. Well, Mr. Ritter, clearly when you're talking about teams of competitors, the current anti-trust legislation that we have is an obstacle. If you're talking about horizontal groups of semiconductor manufacturers, for instance, right now, under current law they cannot engage in joint manufacturing. That's why the legislation moving through the Senate is very critical.

However, what we are proposing to do in the Technology Administration is a very significant change in that our industry user service is going to bring in non-competitors to look at enabling technologies and how they might organize themselves to utilize these.

Let me give you a specific example. If you take, for instance, the area of materials, it's an enabling technology. An ideal type of industrial structure to capitalize on that would perhaps comprise an aerospace player, an auto maker, computer and systems maker, clearly someone in the semiconductor world as well, and even a sporting goods manufacturer as well, all having a vested interest in materials technology for their specific product line.

That is an approach that is not common in the United States. It was at one point. We did have strong vertically integrated firms.

The area where I think we're very, very weak in this Country—and this is not something that is talked about as it should be—that we still think our small and medium sized firms are our hope and salvation for technology creation and commercialization. There's no question that our small and medium sized firms are tremendous innovators of technology and many of our crowne jewels lie in these firms, but right now, given the dynamics of the global competition, they are so fragile to the competition. A good example is the flat panel display industry.

Those few companies that are left that are serving markets. They have the most valuable technology. They are very weak in terms of capital. They are literally starving for capital in our capital markets. In my view, I will be very surprised if these companies survive and are not acquired by foreign entities.

Mr. RITTER. It's a sad commentary. For those who are not familiar—in Japan it's a tremendous availability of low cost capital for just those small and medium sized firms. They have small business activity which makes our Small Business Administration, on a scale of one to ten, look like one compared to their ten. They're actually actively capitalizing these growth companies and high tech, high valued added producers.

Mr. Chairman, thank you very much for recognizing me, and I yield back the rest of my questions.

Mr. VALENTINE. Mr. Thornton?

Mr. THORNTON. Thank you, Mr. Chairman. I want to express my appreciation for the good testimony that the witnesses have provided this morning. I realize that as we proceed through the authorization part of our work that we tend to focus on how we're doing compared with last year and what changes we're making and how we're fine-tuning the effort.

I'm aware that there is much more involved than that and that indeed we need to be looking over a longer time span.

A few years ago we started the report of the National Science Board on Science and Engineering indicators in order to determine over a longer span of time just how we're doing. That document shows that while we have continued to spend a lot of money, we have not accomplished all of the results that we would like to have accomplished. The American share of high technology goods in the world market has declined from over 50 percent to just over 40 percent. We have fallen behind in several areas.

I just want to ask you whether the presentation you're making today also bears in mind the outline set forth in Secretary Mosbacher's report of last spring on "Emerging Technologies: A Survey of Technical and Economic Opportunities", which lists four areas, for example, of emerging materials, emerging electronics and information systems, emerging manufacturing systems, emerging life sciences applications—it points out that in all of these areas, the trend for the United States vis a vis the European common market, is downward. The suggestion of 1989 is that we're behind Japan in advanced material, advanced semiconductor devices, digital imaging technology, high density data storage, optoelectronics, high density data storage, even in superconductors and ahead in some other areas.

My question is, sir, whether we are approaching this from a historical perspective and with a plan to try and improve our position in these areas, or if we are looking at it from more of a short term.

Dr. LYONS. That's a very good question, Mr. Thornton. It is good to have you back.

Mr. THORNTON. Thank you, sir. It is good to be back.

Dr. LYONS. I hope you will come back to see us again.

Mr. THORNTON. I will want to do that.

Dr. LYONS. There are two things to observe about that report on emerging technology. Incidentally, I think it is consistent with all the other reports that we read on that same subject. One is that we are in better shape if you evaluate our research laboratories than if you evaluate our market share. It is also true that the trends are in the wrong direction in both cases. It probably fares to say that, in terms of generating new technology, we still lead the world. In terms of market share, obviously we—

Mr. THORNTON. I'm certainly glad of that.

Dr. LYONS. We—Deborah and I and Bob White—talk in a slightly different tune, I think, than most other agencies do. We say that our problem is not in generating technology; it is managing it and commercializing it, it is going to market where we are in trouble. And so it is not necessary the correct solution to throw money at the laboratory efforts, but rather to try to worry with our industry about how they then take advantage of their opportunity. There are lots of problems, as you know probably better than I, things like cost of capital, which Mr. Ritter was talking about, the problems as Deborah was talking about with the anti-trust laws and with the electrical property laws and the whole level playing field business. But, for a whole variety of factors, then, we are not doing as well as we used to do relative to our competitors. And this is entirely an international problem. If it weren't for off-shore, we wouldn't be talking about this subject, I'm sure.

So our programs, our new ones that came to us in the 1988 laws that created TA and created the NIST, are a set of programs aimed more at going to market. These programs are experimental. I regard the ATP and the MTCs and these other things that we talk about in acronyms as experiments.

So when some folks say, "Why don't you double or triple those budgets?" we say, "Let's find out whether they work for us before—

Mr. THORNTON. Yes, sir.

Dr. LYONS. And in a tight budget environment, I can't imagine any other approach. You can't throw money at problems any more. So we are running these experiments.

The ATP is aimed at commercializing technology. The MTCs are aimed at moving from big to small places in knowledge that has already been generated. So both of these are in the technology movement, diffusion, and commercialization area and not in generation.

I probably just gave Deborah's speech, but you might want to add to that. We feel very strongly about it.

Mr. THORNTON. Thank you.

Deborah, would you—excuse me, Doctor Wince-Smith, I apologize for the informality.

Ms. WINCE-SMITH. Thank you, Mr. Thornton.

Well, let me mention something following up on the Advanced Technology Program, the Advanced Technology Program that Dr. Lyons has said so eloquently. This isn't an experiment. What is significant about it, in addition to generating technology with commercial potential, is the partnership that is going to form. When we put together inside Commerce the criteria for the program, one of the things we included that was very new was that the companies that came forward with proposals had to have some plan in mind of how they were going to carry forward and deploy the technology, because otherwise, if that is not in place, what we will see occurring in the Advanced Technology Program is the government providing resources to develop technology that is much closer to the proprietary end of the spectrum that, in effect, is being thrown out into the open domain to be picked up and commercialized by our overseas competitors.

Now, the issue that is very much the challenge for the United States is that, while we have this incredible machine for creating technology, we do not have, for a variety of reasons, the environment in place for its commercialization ahead of our competitors. Today it is irrelevant who creates the technology; it is who embodies it in a good or a service and captures the initial market share. That's the challenge we face.

Mr. THORNTON. May I just point out there that the one area, according to the science indicators on which the United States has built a significant lead, is in our licensing of our patents overseas. We have done a good job of taking our intellectual knowledge and having it built somewhere else— not that I agree with that direction, but it has been a happening.

And I think your statement today and your responses are really outstanding in suggesting that the environment, itself, needs to be addressed. You are grappling with some of the difficult questions of restraints upon partnerships in the United States as something we should look at.

You mentioned the product liability system which may stifle innovation.

I wonder if, also, some of our laws may encourage the management of corporations in a attitude of self-protection to seek the short-term profit year by year out of fear that a stockholder's derivative action could be brought to assess personal liability upon the directors of a corporation if they make the decision to defer a short-term profit in order to build quality, in order to develop a long-term position in an area, and should we be looking at those questions, as well?

Ms. WINCE-SMITH. I believe we should, and, indeed, the President's Council on Competitiveness has a major effort in product liability and has put forth legislation in that area.

The other critical issue, though, that Mr. Ritter mentioned that I have in my written statement pertains to this issue of the cost, patience, and availability of capital. Let me give you a concrete example.

In the biotechnology industry, we know that our biotechnology companies now, through interviews with their CEOs, see their future in forging strategic alliances with their international competitors. The reasons they have said that they would be doing this in the 1990s and beyond has nothing to do with joining together for technology reasons; it is because they are capital starved.

Mr. THORNTON. Yes.

Ms. WINCE-SMITH. And they feel that is the only way they can survive. We don't have any way yet in the U.S. system, both in the Executive Branch and in the Congressional Branch, to begin to look at how our financial system impacts technology utilization.

Mr. THORNTON. Yes.

Ms. WINCE-SMITH. We took a first step in Commerce just in January. My office co-chaired with the Treasury Department a round table on financing technology. We brought together some leading CEOs of technology companies with financial providers, senior Wall Street bankers, investment portfolio fund managers, pension people. It was amazing. They talked about all the issues of why there are shortfalls in providing capital for U.S. technology commercialization.

The issues that came out are all relevant to the sweeping banking reforms.

Mr. THORNTON. Yes.

Ms. WINCE-SMITH. We have to have some way, for instance, when we look at whether or not we want to maintain the Glass Steagall Act, which keeps banks and businesses separate, whether that is one of the impediments. The Germans and the Japanese don't have those laws at all, and in the Keiretsu structure they can provide 2 percent loans for all of this vast technology development that our companies can't obtain through our financial system.

Mr. THORNTON. I think it is exciting that you have the vision to develop team approaches like this, because I think we are going to have to do some things that are different. We are not going to be able to pursue the same actions of the past.

I want to thank you for your testimony. I would like to ask that you do your best to educate me on the things that you are doing so that we can develop across this aisle a partnership as we seek to improve American competitiveness.

Ms. WINCE-SMITH. I would be very honored to do that and would look forward to it. Thank you.

Mr. THORNTON. I yield back the balance of my time.

Mr. VALENTINE. Thank you, sir.

Mr. Gilchrest?

Mr. GILCHREST. Thank you, Mr. Chairman.

I would like to make a quick comment about the metric system, and I know you are trying to push that in industry and commerce, if somehow you could use your influence to encourage public schools to begin teaching that at an earlier stage of their development and to emphasize the importance of it. I know I have two sons beginning to learn the metric system very briefly. They run through it and then they get back to inches and feet. But that might be one avenue, and a lot of people would be—they would receive that very well, I think, in the public school system. I don't know how you would do that, but the Commerce Department could put out a letter. I think it would be well received. I'll talk it up in my district.

The team approach—non-competitors to accomplish these goals—and you answered that question as far as the pre- competitive aspect of that. I wonder—these are fairly basic questions—how is that going to work with the manufacturing centers? You said you had three and you want to increase those to six. I'd like to know exactly how the manufacturing centers work within their region to foster or enhance technology and the competitiveness of those particular industries, and how a particular region, if they, for example, if a community notices some failing high-tech industries, how they could contact those manufacturing centers.

Mr. LYONS. Mr. Gilchrest, we are talking here today about two different kinds of manufacturing efforts, or maybe three or four. The manufacturing technology centers, which I take it you are addressing with that question, are just one of a series of programs that both of us manage.

The manufacturing technology centers were set up originally—not so long ago. We're only at the end of two years of history with them—to move technology initially from NIST, from our laboratory, out in a rather narrow area of advanced factory automation kinds of things—robots and smart machines, and lots of computers. And the idea was that we could not reach small companies—machine shops of less than 50 or 100 employees—at all because those people can't travel very far. They are busy running the business. They can't go to Washington or to laboratories out in Maryland. So the question is: how do we get this information to them?

We never had a problem talking to big companies. They can send skilled staff to our place and spend as long as it takes to extract the information.

So the concept of setting up regional centers where our technology could be set up in kind of a demonstration forum that the center would have some machine tools and some computers and some skill staff, and that would enable the small businessman to come—one hopes not more than an hour or two from his shop—and talk about the technology, perhaps try it on the machines available. That center staff is also charged with going out and reaching out to the small businessman, visiting him, assessing if he likes—assessing his business and his needs, the kinds of technologies that might help him as opposed to somebody else, and also to provide some training or retraining, actually.

The three centers that we have now all have access to two-year schools—junior colleges or tech colleges in South Carolina—and that is in order to take the staff that may not be used to computer-controlled machinery and give them— develop short courses and actually train them.

These are not R&D centers. They don't develop any technology. They simply take it and package it and move it around and make it available. That's what the NTCs do.

We don't believe there will ever be a great many of them, so one of the things we need to do is figure out how to go from these centers—of which there will be a small number, probably, even many years in the future—and build networks out from them, probably through things like junior colleges and small business development centers and other existing mechanisms, because we have to find a way that—there are 200,000 small businesses in this country that are interested in automation technology, and so we get a terrible problem of multipliers. How do we multiply what we are able to do enough number of times to reach out to all of those 200,000 firms? Prodigious undertaking.

Mr. GILCHREST. My other question is—I have a much better understanding of that process now. Looking into the team approach, and I guess getting back to the research end of this, how well do you access or envision spin-off technology from military labs? Is there any joint venture there at all?

Ms. WINCE-SMITH. Well, there's no question that there is very close collaboration now between DOD and most of the R&D agencies. This has been encouraged and strengthened, I think, with the whole inter-agency process that is underway through the FCCSET Committees as well as the Council on Competitiveness, the Economic Policy Council, the whole inter-agency policy structure. DOD is an active member. I think Doctor Lyons referred to the new initiative between Commerce and DOD on standards.

Let me mention one that is very, very relevant to what I am doing in the manufacturing area, and that's coordinating our response and domestic effort in intelligent manufacturing systems with DOD—and I believe Doctor White mentioned this yesterday, as well.

DOD, through its Defense Authorization Act, has a major, new responsibility in manufacturing to support the industrial military base. There is no question that the commercial linkage to that is direct and essential.

One of the problems we have had in U.S. industry has been that it has been producing goods for very specialized, narrow Defense markets, and when those markets dry up or they change there is no way they can gear up to move to the commercial area, and you have to be competitive in both today.

And through DARPA, we have very close ties with DARPA in the whole range of technologies, and I know DARPA was a big player advising us and helping us in the Advanced Technology Program.

So I think that we are going to see much more integrated activities between DOD and the other R&D agencies, and that has to be so.

Mr. GILCHREST. Thank you. This has been enlightening and very hopeful news for the future.

I would like to say that there are a lot of geese in Kent County where I am from. Thank you.

Mr. THORNTON. I'd be glad if there were about 2,000 more.

Mr. GILCHREST. We have quite a few. Thank you, Mr. Chairman.

Mr. VALENTINE. Mr. Bacchus?

Mr. BACCHUS. Thank you, Mr. Chairman.

I see the microphone works today.

Mr. **Valentine**. Yes. We made some advancements.

[Laughter.]

Mr. **Bacchus**. Inside joke.

Ms. Wince-Smith, I am an admirer of yours and appreciate your testimony. It is very provocative and deserves a great deal of attention.

A few comments and suggestions.

On page 15 of your testimony you rightly conclude with an emphasis on the need to interest young people in math and science. That, of course, is not directly within your purview. It is a goal we have established as a Nation. I think the President was right to do that.

I am very happy that his science budget for research and development this year includes special attention to encouraging young women and minorities to invest in advanced research and development graduate work, and I would like to encourage you in your work with the private sector to do exactly what I think you will do, which is emphasize women and minorities because, as I'm sure you know from the Labor Department's Workplace 2000 Study, two out of every three of those people who will be coming into our work force between now and the end of this century are women and minorities, and if we want to encourage our citizens to become productive scientists and engineers and mathematicians, then we are going to have to encourage women and minorities to do that because those are the ones who will be coming into our work place.

Secondly, I want to commend you for all your work on advanced manufacturing technologies and your emphasis there on small business, as well. I would merely reflect upon my own background. I represent Central Florida in Congress, the 11th District in Central Florida, which includes Orlando, and before I was elected I was one of the board members and officers of the Greater Orlando Chamber of Commerce.

We conducted a study just a year ago to find out where our growth was in Orlando, and even in the midst of this recession we are continuing to be among the leaders in job growth nationally. And we found that 90 percent of the businesses in our metropolitan Orlando area had ten or fewer employees. At the same time, in that area, in my 11th Congressional district, more than 40 percent of the workers make less than poverty-level wages. Clearly, if we want to improve the standard of living of our people, we need to invest in exactly the things you have been talking about all morning and invest in making certain that our children and those that come into the work force can participate, but we also have to make it possible for small businesses to have access to that technology. So I think your emphasis is well placed.

In addition, I want to commend you on the Japanese literature program. I served as a trade negotiator for this country, and I was fortunate in that the language of international trade negotiations is English. My language facility extends beyond English only to college French, and not much further. That I would say is my most serious shortcoming as a citizen and certainly as a Member of this Congress. I have read Paul Simon's book, "The Tongue Tied American," and it is very important for us to be aware of what is happening around the world. The world is shrinking, but it won't shrink for us in terms of access to technology unless and until we are able to communicate and able to read the advances of other nations.

Finally, I have a question for you. On page three of your testimony you make reference to two particular areas, and these are areas that I am struggling with personally. One is the issue of product liability. Now, it has been a decade since I had the privilege of representing this country as a trade negotiator, but I do recall that, while I worked at USTR, there was an endless parade of domestic industries who came through our offices asking for protection, asking for fair treatment, pointing out problems they had in world competition. In many cases I thought they were justified.

Never once did I hear anyone mention product liability as an issue, and yet it appears to be on the competitiveness agenda now.

On the other hand, I have within my district the Piper Aircraft Firm, which is in some straits now. They claim that one of the reasons why they are in the straits that they are is because of product liability.

I would like to ask you precisely how does apprehension about product liability stifle innovation?

Ms. WINCE-SMITH. The analysis that has been done on this—and I would be very happy, sir, to provide you with some of that from an academic and technical viewpoint. The analysis on this has indicated that a firm that is moving into forefront areas that are high technology intensive but still embody some risk are being very cautious about making the investments, both in the R&D area and, more importantly, in the commercializing, for fear of excessive product liability suits that can literally wipe them out of business.

[Material referred to follows:]

PRODUCT LIABILITY

Question:

How do product liability concerns stifle innovation and what is the Administration's position on Federal product liability reform?

Answer:

In a 1988 Conference Board survey of CEOs from both large and small businesses, 40% of those responding agreed that product liability was having a major adverse impact on their companies. It influenced how they planned and how they did business. It affected how they spent huge amounts of their time. Rational business planning was being seriously affected by the uncertainty of the system. Just as alarming, 75% of the CEOs expect that the future impact of the product liability system on U.S. competitiveness will grow in significance.

The costs of the product liability system that the CEOs spoke of are both direct and indirect. The direct costs are either absorbed by the businesses or passed on to consumers in the form of higher prices. On the other hand, the indirect costs are difficult, and in many cases impossible, to quantify and they reflect a business attitude about the uncertainty of the product liability system. Indirect costs are reflected in useful products being discontinued, decisions not to develop new product lines or not to continue product research, and a fear to innovate.

The CEOs reported that, because of fears related to product liability, almost half of the responding firms had discontinued product lines, 39% had decided not to introduce new product lines, 25% had discontinued product research, 9% had closed entire production plants, and 16% had laid off workers.

Another indirect cost of the product liability system is the chilling effect it has on research and development by both industry and the academic community. There are reports of universities shying away from licensing patents to small manufacturers because of their fear that, as the originators of the idea upon which a product was manufactured, they will become the "deep pocket" if there is litigation involving the product. This type of situation threatens our leadership in research and development and can only harm our overall competitiveness.

In the 101st Congress, the Administration strongly supported the changes made to our product liability system by S. 1400. The Administration believed that the bill was a moderate, reasonable and well-balanced package of reform measures. The bill encouraged U.S. business innovation and improved U.S. international competitiveness. At the same time, it preserved essential protections for American consumers. It would have improved the competitiveness of the United States by adding a degree of uniformity, certainty and predictability that has been missing under the existing product liability system. I understand that the bill will be reconsidered as S. 640 in the 102nd Congress.

Ms. **Wince-Smith**. I agree with you—it is a new element on the horizon, although certainly in the pharmaceutical/biotechnology industry it has been around for some time.

Mr. **Bacchus**. What is your remedy there? Not to give someone a cause of action if a poorly-made airplane crashes?

Ms. **Wince-Smith**. I think there is a fear that, because of the way our court system is structured, that the liability awards could be so great and could take on such a personal character that the company would really not be able to sustain itself.

Mr. **Bacchus**. So you favor a ceiling on awards? Is that—

Ms. **Wince-Smith**. I think the Administration's position is that they are looking at a balance on this to balance the appropriate protection that our consumers and citizenship have versus the competitive needs of industry, and the high premiums issue is one that factors into that. I would be happy to provide you some more information on it.

Mr. **Bacchus**. I realize it is not directly within your area, but it is something you mentioned and it is an issue that I am looking at currently.

Second, you also mentioned the proposal for reduced export controls. I have struggled with that issue over the years, and I have concluded that in many instances it is a case-by-case basis, especially as it relates to COCOM issues.

You mentioned the strategic alliances and the notion of working cooperatively with other nations, which I support as a general principle. But I was very concerned this past year when, in spite of all of the events in the People's Republic of China, the President granted an export license that enabled the Chinese, of all people, to launch an American-made satellite on one of their long-march rockets from out west of Beijing. I was especially concerned because I didn't think that was the kind of statement that we should be making as a country since the Chinese have not in any way repented for their actions. Parochially, I was also concerned because there is a good chance that, had that satellite not been launched from China, it would have been launched from Brevard County in my district.

I'm very concerned about the development of our commercial space industry. I feel that aerospace and space are one of the few areas in which we remain the world's leader. I want to make certain that we do all that we can as a Nation to keep ourselves on the cutting edge there. Why in the world should we be granting such export licenses at this time?

Ms. **Wince-Smith**. Let me try to answer that, if I may, from the perspective of where I am sitting in Commerce because I, of course, do not have direct responsibility in the export control area.

Mr. **Bacchus**. I do understand that.

Ms. **Wince-Smith**. And I did participate in some of these types of decisions when I served for five years in the Reagan Administration, OSTP, and got involved in some of these issues.

I think one of the things we have to recognize is that the current reality in our government is that in many cases foreign policy initiatives, foreign policy rationales, are often what drive decisions that have profound economic impact for our country.

Mr. BACCHUS. And that is unfortunate, in my view, in many instances.

Ms. WINCE-SMITH. And I tend to share that view. I say that because of where I am sitting. I think at some point we are going to have to reassess in our country the extent to which our economic interests always play second fiddle to some of the foreign policy considerations, and that is an issue that is far beyond my responsibilities, but it is one that Commerce is constantly engaged in because we sit at the table as an agency that is representing the issues of U.S. business, and many, many times we know that those issues are being pushed down because of these other considerations. The FSX fighter deal I think with Japan was a very good example of that where, fortunately, President Bush came in and we were able to look at that and strike a much better balance between foreign policy objectives and very strategic interests for our U.S. aerospace industry.

Mr. BACCHUS. I appreciate your discretion and your diplomacy in the remarks you just concluded, and I sense what you are telling me.

Let me say if I, since I don't sit in your seat, can be specific in these terms.

I, too, have sat at some of those same tables in those inter-agency meetings, and I'll tell you what happens. Commerce and USTR make the case for American business and the American economic future. The State Department usually doesn't want to offend anyone in any foreign country for any reason. When the Pentagon sits in those meetings, their sole concern is our national defense, and if the country is cooperating with us in terms of our national defense strategy, then they don't want to defend them for any commercial reason. I believe this is short-sighted.

In the long term, the only thing that will give us the strength to stand up for our interests internationally is our economic strength here at home. We won't be able to afford to stand up for freedom either here or abroad unless we stand up for American business internationally, and for that reason I oppose such endeavors as the granting of an export license to enable the Chinese to launch an American-made satellite when they are engaging in terrible human rights abuses and are unrepentant for doing so. And you can expect me to voice this perspective on this subcommittee and in other forums while I am in the Congress.

Thank you very much for your assistance and your testimony and your service.

Mr. VALENTINE. Mr. Rohrabacher?

Mr. ROHRABACHER. I'd like to join my colleague in his remarks concerning space commercialization. Because of that I have a question for Dr. Lyons.

Dr. Lyons, on the 22nd of November, 1989, NIST held a conference entitled "Reducing the Cost of Space Infrastructure." I understand that the proceedings are in the process of being printed, and I would like to know if I could—maybe you could write this down to send me a copy, and I would like to know if it would be possible for me to receive a copy of the transcript of that.

Dr. LYONS. Certainly. We'll take care of that.

Mr. ROHRABACHER. All right.

[Material referred to follows:]

The proceedings of the workshop on "Reducing the Cost of Space Infrastructure" have not been published and will not be available in the near future. General information on the workshop can be obtained from Dr. Cary Gravatt, Building and Fire Research Laboratory, National Institute of Standards and Technology, Gaithersburg, Maryland 20899.

Mr. ROHRABACHER. Just a couple thoughts, and then I just—a lot of the things that we hear about in terms of competitiveness, I think that it has less to do with the government actually coming in and solving the problems than it does with the government getting out of the way. When we're talking about anti-trust legislation that inhibits our own corporations from competing from—it's not competing, but cooperating in meeting the foreign competition, as compared to the incredible cooperation that is mandated by foreign governments and their corporations and other regulations that get in our way—we have heard about the cost of capital and how in other countries it is easier for smaller companies to raise the capital necessary to put products into the market. And, again, some of those other countries—and I'm not sure if this is correct, but isn't it true the Japanese don't have a capital gains tax? And Japanese don't have capital gains tax, and we can't even get Congress to consider reducing our capital gains tax while, at the same time, we see a number of Congressmen with very large crocodile tears crying about American competitiveness.

Finally, when we talk about product liability, obviously there is something that could be changed. We could actually change the rules of the game and correct this problem with just some attention, and it would not be of major cost to the taxpayers.

I just want to leave it with that thought and ask you your opinion. Isn't—actually, couldn't we help America's competitive position with actually very few little major outlays of money but just a lot of attention paid to correcting some of these structural problems?

Dr. LYONS. I think that's correct and I think that's what we're doing. The outlays that we are talking about are not, in terms of Defense budgets or Social Security, or what have you, very large. Most of the factors that we have been talking about today—both of us talking about—are things like cost of capital and various legal restraints. The fiscal system and the legal system are certainly getting in the way, and the Commerce Department for many years has been working at trying to remove them, and there has been a series of laws passed that began in the early 1980s that first allowed us to do cooperative R&D, for example. You couldn't even do research together in the private sector until the Cooperative R&D Act was passed. The Federal system was generating a lot of technology and not doing very much with it. The Stevenson Widler Act was passed to try to get at that problem. So I would agree with your essential premise.

Ms. WINCE-SMITH. Let me just comment, sir, that I agree, as well. And I want to agree with the caveat that I don't want to imply in my remarks that the Federal Government does not have an important role in the seed corn and basic research that we need for the future and this generic enabling technology that is so complex and expensive that no one industry or company can do that R&D alone. But creating this broad environment is really the challenge.

My concern about this—and this is perhaps something I might suggest, Mr. Chairman, that your subcommittee and Commerce could think of working on—is that there is no way we are going to make progress on these issues as long as we stay in the confines of the Science and Technology world, per se, because the responsibility, the jurisdictions on these issues, go beyond our purview, but our goals are so hindered and hampered by this. Every industry group I talk about laments this environment in which they are operating. They say, "What are you going to do about it?". Well, where we are sitting in Commerce, we are not going to be in the definitive position on some of the financial reforms and the economic things that have to be taken care of. There are other parts of the government that we interface with, and it is the same in the committee structure.

But I think we have to think of some way to join forces on this or we are just going to be pushing at the edge.

Mr. ROHRABACHER. One note at this point is that's—a lot of us have come here to Congress from the private sector, and we sort of look at—some of fellow colleagues seem to look at private business and the private sector as the enemy. Certainly this is such a different attitude than you find in Japan. Our competitors are faced with the situation where their government is doing everything they can to try to make sure that their businesses are competitive, where quite often it seems that Congress is spending all of its time trying to regulate and control and put the shackles on our private sector because they look at them as a potential enemy or as a cow to milk. I think this attitude, unfortunately—America is not going to be competitive as long as this attitude prevails among certain people who are making the laws.

Ms. WINCE-SMITH. May I just add, if I may, that one of the witnesses on the subsequent panel, Doctor John McTague, I think is someone who is better positioned than almost anyone to talk about some of these issues, from both having served in the White House as Acting Science Advisor, and been a director of a National Lab, and now has a senior position in U.S. industry in a global environment. I'd certainly hope that these questions could perhaps be directed to him, as well, because he has so much to contribute in this area.

Dr. LYONS. I'd like to add one additional comment, if I may, sir. I think the relationship between government and industry that you are talking about is infinitely better than it was 20 years ago when I first came to Washington and the camps were totally polarized and busily suing each other at every opportunity. We now have terrific collaborations like SEMATECH, which is the manufacturing consortium jointly funded by the government and the semiconductor industry. That's a great example of how you can pull together and each side puts in a dollar and takes out an advantage.

An analysis of the environment that I find particularly compelling, partly because the analysis is so good and partly because the industry which did it, is the one that the National Advisory Committee on Semiconductors has put together now in two annual reports. This is the Silicon Valley folks who are not known for embracing the Federal Government, but also are suffering some of the worse forms of environmental difficulties, and particularly the cost of capital.

They have just issued their second report. It is just out now in limited edition. I would commend both of those reports for good analysis of the problem—not so much their recommendations, but the problem analysis there I think is excellent.

Mr. ROHRABACHER. Thank you very much, Mr. Chairman.

Mr. VALENTINE. Thank you, and thank all of you for very helpful, meaningful testimony.

Other members of this subcommittee not present might want to submit questions to you. We'd appreciate it if you would give those your attention.

We'll move on to the second panel. That consists of: Mr. Clyde V. Prestowitz, Jr., author of "Trading Places," and president of the Economic Strategy Institute. I understand, Mr. Prestowitz, that you have a train to catch. We will keep that in mind. If you think that you—when it is time for you to go, you just jump up and take off. We'll understand.

Also, Doctor John P. McTague, vice president of Technical Affairs, Ford Motor Company, Dearborn, Michigan; and Mr. Joseph O'Grady, President of the American Society for Testing and Materials from Philadelphia.

Welcome. I ask if you would condense your remarks to five minutes if you can accommodate us to that extent. Your prepared statements will appear in the record as submitted to us.

Mr. Prestowitz?

STATEMENT OF CLYDE V. PRESTOWITZ, JR., PRESIDENT, ECONOMIC STRATEGY INSTITUTE, WASHINGTON, D.C.

Mr. PRESTOWITZ. Thank you, Mr. Chairman.

Listening to the comments of the other witnesses earlier this morning, I'd like to draw your attention to what I think are the two key factors in this debate. One of them, interestingly, was raised in a meeting that I had on Monday. At a meeting of the Pacific Basin Economic Council, the assistant secretary of state for East Asian affairs, Dick Solomon and his deputy assistant secretary for economic affairs, Robert Fauver, were present. We were discussing U.S. trade and U.S. trade policy. In that discussion, the deputy assistant secretary, Mr. Fauver made the statement that he didn't see any difference between exporting bushels of corn and exporting optical fiber cable—"one hundred dollars worth of corn and one hundred dollars worth of optical fiber," said Mr. Fauver, "is the same thing, one hundred dollars."

That echoed a statement that was made a year or so ago by Mike Boskin, the chairman of the Council of Economic Advisors, when he said "potato chips, semiconductor chips, what's the difference, they're all chips? One hundred dollars worth of potato chips, one hundred dollars worth of semiconductor chips, that's one hundred dollars."

And that echoed a statement that was made in the fall of 1985. You may recall that was the time when Japanese semiconductors were being dumped massively in the U.S. market. Then-Secretary of Commerce Baldrige proposed to the cabinet that the government try to stop the dumping, and in a discussion which I was present in the White House, then deputy secretary of the Treasury, Dick Darman made the comment, "Why do we want a semi-conductor industry? Dumping" he said "is good for the consumer who gets cheap chips. We don't want some kind of an industrial policy in this country," said Darman. "If our guys can't hack it, let them go."

Now, Mr. Chairman, as long as that attitude, which implies that what the United States makes is not important, that whether we make potato chips or wood chips is not important, then a lot of the other activities of the Government and of this committee are really in vain.

The second point I would like to make is that, in this whole discussion of the cost of capital and the problem of commercialization, we focus a great deal of attention on the creativity of American industry, and we lament the fact that somehow this very creative industry cannot somehow commercialize its products, and we lay that down to poor management, to short-term management thinking, to lack of capital, high cost of capital. And, of course, all of those factors play a role.

But what is never mentioned is the question of risk. And let me put it to you in this way: right now in California there are several small companies making flat panel displays. Flat panel display technology is going to be one of the key to advanced computing in the 21st century. There is nothing wrong with the American technology. In fact, it is, according to DARPA, the American technology is the best. It is better than current Japanese technology. But I can guarantee you that those West Coast companies are not going to commercialize their technology, and the reason is not because they are short-term oriented, it is not because of poor management; it is because you have some giant Japanese companies who are selling in this country products below the cost of production. And those giant Japanese companies have a history of collusion and of predatory trade practices in the United States, and there is a history of the U.S. Government doing nothing about it. So that the risk—if you are a venture capitalist, you are not going to put money into those companies to help them commercialize their products because you know they are going to get killed because you already know what the Japanese companies are going to do.

If you were the chairman of IBM, if you were John Ahern, and you proposed to your board to put money into these little companies to help them commercialize flat panel displays, your board would fire you for fiduciary irresponsibility because you know in that kind of competitive situation you are not going to make a profit, and that has nothing to do with savings rates and all the rest of it; it has to do with the policy environment and the lack of response of U.S. Government to any of the trade problems and industrial structural problems that we have seen over the past 20 years.

So I would submit that, while I strongly support the efforts of the Commerce Department, I support all of the proposals that have been made and strengthening the budget of NIST and more cooperation between the Commerce Department and between government and industry. I support Semitech. I support change in the anti-trust laws. All those things are worthwhile doing and you should do them, and your bill is something that should be done. But until you address those two problems, the rest of it is simply not going to work.

You know, Senator Bentsen gave a speech at our conference yesterday, and he made a very telling comment. He said, "The Commerce Department recently put out a report on critical technologies, and according to the report the U.S. is either behind or falling behind in all of those technologies." And the Senator said, "And what is the response?" Of course, the answer is there is no response. And the Senator then said, "Can you imagine if that report had been presented to the Jack Kennedy? Look at what Kennedy did when he found out we were lagging in space technology—he launched NASA."

You need to have—I note the title of this bill is the American Preeminence and Technology Bill. What you need to have is the leaders of both political parties making it the top priority to achieve preeminence in technology for the United States.

Thank you.

[The prepared statement of Mr. Prestowitz follows:]

Economic Strategy Institute
Rethinking Economic Strategy

The Economic Strategy Institute (ESI) moved into its current offices and began operating at full capacity in June 1990. ESI's mission is to alert the nation to a series of complex threats to the economic strength that undergirds its security and freedom, and to define a wholly new economic strategy to assure American industrial and technological leadership.

The Institute's initial task was to challenge the conventional ideas about economics and politics that have underpinned American policy making for decades, but that with each passing week seem increasingly at odds with our rapidly changing world. Our research pointed to two especially fundamental and questionable assumptions.

First is the belief that the prime concern of economic policy makers should be to assure maximum consumption and production, and that consequently what a nation produces doesn't matter. According to Michael Boskin, Chairman of President Bush's Council of Economic Advisors, "Potato chips, computer chips. What's the difference?" In other words, whether we chop down trees and sell logs, or make airplanes and supercomputers, is of no import.

The second key assumption flows from the first. It holds that a country's relative economic performance is unimportant as long as its absolute performance is improving. Since there is supposedly no reason to worry about losing entire industries to foreign competition, there is by extension no reason to worry about losing national technological superiority -- or about falling behind in any way. International economics, Americans have been taught, is always a positive-sum game. If everybody plays by the right free-market rules, everyone is better off. And even if everybody doesn't play by these rules, everyone is better off if some -- especially an economy as large as America's -- continue to do so. Thus if Germany is growing at 5 percent and the United States is growing by 3 percent, Americans should be pleased. After all, both countries are growing. And such a world is thought to be far better than one in which America is growing by 2 percent and others are growing by 1 percent.

In other words, U.S. policy throughout the post-World War II period has assumed that economics and economic policy-making have nothing to do -- and should have nothing to do -- with values, mores, psychology, political and social institutions, and, above all, international power relationships. In this view, the only proper object of economic policy-making is creating as much wealth as possible at any given moment. In fact, nation-states, the characteristics of states that distinguish them from other states, and the national interest itself are seen as backward notions -- concepts that have become obsolete in an age of globalization and interdependence. And it is taken for granted that most other states share these beliefs and act accordingly.

Our greatest problem with these ideas is that they describe a world that is not strategic in any way. In fact, having a strategy in such a world is thought to be the worst possible policy because it denies the assumption of laissez-faire and reflects the notions that "catching up" or "remaining the leader" are important.

ESI believes that the world is still a strategic place, and that as a result, all three pillars of the conventional wisdom are dead wrong. Because the world is strategic, and will be for the foreseeable future, economics cannot be divorced from international power relationships. Military power, economic power, and political power are in fact all mutually reenforcing. If a company or industry or country starts falling behind in one area, all other areas will eventually follow. Worse, countries that fall behind will start to lose their political independence. In other words, international politics and economics is a high-stakes competition, not a sporting event. Losing can have devastating consequences.

As a result, maximizing consumer choice in the short term cannot be the only goal of economic policy. It is critical to worry about the long term, and to understand that fixing single mindedly on the short term can not only wreak havoc with a nation's values, but with its ability to stay wealthy and preserve consumer choice over the long term.

In addition, ESI believes that a nation's industrial structure is critically important to its long-term wealth-creating capability, and therefore to its long-term security and freedom. Through linkages with numerous other industries and through the spill-over effects of research and development, these industries can help countries sustain and enhance their economic power for decades, even if the short term payoff is unimpressive compared with other kinds of economic activity.

Finally, we believe that because we live in a stubbornly strategic world, a nation's relative performance can determine its absolute performance. And relative position is especially important in a world of rapid technological change, and a world in which competing in global markets in the knowledge-intensive industries of the future is fantastically expensive. Again, countries that fall behind will stay behind, and their long run capability to create wealth will suffer dramatically.

What kinds of policies would ESI like to see adopted to achieve economic excellence? We believe that without vision, leadership and coordination, excellence will never be achieved. And these are qualities that the private sector alone, for all its strengths, cannot provide. Needed instead are imaginative new forms of government-business cooperation capable of helping America meet the daunting challenges it faces in the coming decade, and into the next century. In particular, we must break out of the sterile debate over industrial policy -- over "picking winner and losers," etc. -- that has stuck us as a nation on dead center intellectually. We must move forward to the critical task of adopting a coherent national strategy that will ensure America's continued economic pre-eminence.

ESI NEWS

Economic Strategy Institute · 1100 Connecticut Avenue, NW · Suite 1300 · Washington, DC 20036 · 202/728-0993

CLYDE V. PRESTOWITZ, JR.

Clyde V. Prestowitz, Jr. is founder and president of the Economic Strategy Institute (ESI), a private, non-profit research center dedicated to defining a new American agenda for an era in which the United States will face unprecedented economic challenges without the benefit of past superiority in industry, technology and finance. Prestowitz was formerly senior associate at the Carnegie Endowment and a fellow at the Woodrow Wilson International Center for Scholars, where he wrote his influential book on the U.S.-Japan economic conflict, TRADING PLACES.

In a recent issue, Regardie's magazine called Prestowitz "one of the most influential people in private Washington." His views are often cited in congressional debates and he is a frequent contributor to major newspapers, magazines and journals.

From 1981 until 1986, Prestowitz was successively Deputy Assistant Secretary of Commerce, Acting Assistant Secretary and Counselor to the Secretary of Commerce. In the latter position, he was the principal policy advisor to the secretary on all aspects of economic relationships between the United States and Japan. The Washington Post, describing Prestowitz, says, "First as a businessman and then . . . as counselor on Japan affairs to the secretary of commerce, he has been in a position to acquire extraordinary firsthand knowledge of trade and trade negotiations between Japan and the United States."

Before joining the Commerce Department, Prestowitz had an extensive international business career. He worked with Scott Paper Company in Philadelphia and Europe; with Egon Zehnder in Europe and Japan; and directed marketing operations in Europe, Asia and Latin America for the American Can Company. He has also served as a Foreign Service Officer in Washington, D.C. and Holland, and as a reporter for the Honolulu Star-Bulletin.

Prestowitz received a B.A. degree with honors from Swarthmore College, an M.A. degree in East-West Policies and Economics from the East-West Center of the University of Hawaii and an M.B.A. degree from the Wharton Graduate School of Business. He also studied at Keio University in Tokyo. He is fluent in Japanese, Dutch, German and French.

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Mr. VALENTINE. Dr. McTague?

STATEMENT OF JOHN P. MC TAGUE, VICE PRESIDENT, TECHNICAL AFFAIRS, FORD MOTOR COMPANY, DEARBORN, MICHIGAN

Dr. MCTAGUE. Thank you, Mr. Chairman.

In view of the late hour, I will try and condense my remarks and give you a prepared statement.

I would like to focus on some of the more prosaic of the issues that have been addressed here today. I agree with almost everything that has been said on the large global issues, but I hope in the considerations we don't forget about the important base programs at NIST. I would be pleased to answer questions on the greater issues, but I would like also to focus on the importance of the base programs at NIST to American industry.

I want to say that I applaud and support efforts to enhance the role of the Department of Commerce in being a partner—a word that has come up several times this morning — and supporter of U.S. industrial technology and in participating in the evaluation of civilian technology policy.

I think the Department is well positioned to take on an even more substantive role in this area, especially in light of the new assignments given to NIST. I believe that Doctor Lyons, Secretary White, and Secretary Wince-Smith have done excellent jobs in their first years in office.

My company, which is the second-largest industrial corporation in the world, is a long-time customer for research and services of NIST, and if there is time I will mention a few of these later.

As has been mentioned, NIST has the longest, closest, and most enduring connections with industry of any Federal agency. In fact, it is the only Federal laboratory with such a history.

Over its 90 years, NIST has continuously served industrial needs, and today it has broadened its services through the new extramural research support and technology transfer programs.

I think it is extremely important to continue to support these activities. We have heard that over the past 15 or so years, despite the importance of this role and despite the increasing investment in R&D being made by other Federal agencies and by the civilian sector even more so, the budget at NIST has been flat in constant dollars.

I am pleased to see that in the last few years this trend is being reversed and that the President, in his budget this year, has proposed doubling the NIST budget over the next fives years to an amount, by the way, which will still be extremely modest on any global scale that you can think of, including even the internal R&D efforts of any one of our major companies.

One of the important things I think that has been addressed in the proposal has to do with manufacturing technology, an initiative which will address fundamental problems faced by industry in developing a new generation of intelligent machine systems.

There is also a proposal for expanded work in crafting international standards for the digital exchange of product data. Both are critical to U.S. competitiveness and, indeed, the role of NIST as a convener [sic] of industry and as a helpful participant in international standard setting is absolutely critical to industry. The cost is extremely low. The impact is extremely large.

With respect to exchange of product data, Ford has been following closely NIST's program on product data exchange specification. This project, when completed, will allow software vendors to provide software products capable of supporting product development, product manufacturing, product field maintenance, and product financial reporting with commodity software products in much the same way we enjoy commodity word processing programs today. The potential increase in efficiency and responsiveness is enormous in terms of interacting with our very diverse supply base, for example — a very different situation from what exists in Japan, where many of the suppliers have almost captive and sometimes captive relationships with the original equipment manufacturers. But here is something that can help sort of balance that off.

Ford's materials research activities, as well as the Automotive Composites Consortium, which has recently been formed by Ford, General Motors, and Chrysler, have been very active in joint projects with NIST, in particular, in the area of composites processing—an area which is going to be extremely important and an area in which the NIST efforts in non-destructive evaluation are also playing a very important role.

However, I believe that no item in NIST's budget is more important to the long-term health and effectiveness of NIST than upgrading and modernizing its laboratory facilities.

Industry and academia are dependent on NIST for high- quality, extremely precise measurements and cutting edge technologies. Reliable state-of-the-art environmental controls; adequate heating, cooling, and electrical service; and safe physical environment are essential if NIST is to remain a world-class laboratory. And I might note, in response to a question which came up earlier, surely $4 million is, at best, a token beginning to this modernization. I would hope to see something more substantive done in the future, even in these very tight fiscal times.

As I pointed out, I think that the most important thing is to the internal efforts at NIST, its in-house laboratory- based researches and services.

The first priority is to provide NIST with the resources required to allow it to continue to be a world-class laboratory. It is important for U.S. industry and government.

With respect to the new responsibilities that NIST has had from the Technology Competitiveness Act, I think it is important that this Nation do more experiments in trying to figure out how to encourage what I might call generic technology. These new areas I believe are very significant experiments along these lines.

I don't want to get into an argument about industrial policy because I don't even know what it should be, and I don't think anybody knows what it should be, even if it should exist. But what I do think we need in this Nation are more experiments and a sense of humility about whether or not we have the right answers.

In summary, Mr. Chairman, I believe that the NIST intra- mural research program is an national jewel on which industry justifiably relies. The first priority of the committee should be to support

NIST's in-house research and services at a level substantially higher than has been supported in the past.

Second, I believe that the expansion and extension of the NIST mission into technology transfer and more general support for civilian industrial technology development are worthwhile experiments; however, any new NIST assignments must also be accompanied by adequate new resources, not at the expense of laboratory-based programs.

Thank you very much.

[The prepared statement of Dr. McTague follows:]

Statement of Dr. John P. McTague
Vice President - Technical Affairs, Ford Motor Company
Before the Subcommittee on Technology and Competitiveness
Committee on Science, Space and Technology
United States House of Representatives
on the Reauthorization of the Technology Administration and
The National Institute of Standards and Technology
February 27, 1991

Mr. Chairman and Members of the Committee:

I am pleased to appear before this Subcommittee to present my personal views on reauthorization for the Technology Administration and the National Institute of Standards and Technology (NIST).

I will be speaking today from the perspective of a private sector research and development manager, as a participant in Federal science and technology policy making, and as a customer and advisor for NIST. Currently, I am Vice President for Technical Affairs at Ford Motor Company. Prior to that, I served as both the Deputy Director and Acting Director of the Office of Science and Technology Policy, and as the Director of the National Synchrotron Light Source at Brookhaven National Laboratory. I was a member of the NIST Visiting Committee on advanced technology from 1988 until 1990 and before that I was a member of a panel of the National Research Council's Board on Assessment of NIST programs. At present, I serve on the newly created President's Council of Advisors on Science and Technology.

In summary, I have spent over 25 years carrying out research, teaching, formulating national science and technology policy, and managing research and technology applications.

Let me begin by saying that I applaud and support efforts to enhance the role of the Department of Commerce in being a partner and supporter of U.S. industrial technology and in participating in the evolution of civilian technology policy. The department is well positioned to take an even more substantial role in this area, especially in light of the new assignments given to NIST. I believe that John Lyons and Robert White have done excellent jobs in their first years in office.

My company is a long-time customer for research and services of NIST, and I will discuss some of these programs later in this testimony.

NIST has the longest, closest, and most enduring connections with industry of any Federal agency. In fact, it is the only Federal laboratory with such a history. Over its 90 years NIST has continuously served industrial needs. And today has broadened its services through the new extramural research support and technology transfer programs. NIST, and the role it plays in the industrial economy, endures.

I am very pleased that the administration proposes doubling the budget for NIST's internal laboratory research programs by fiscal year 1996. For some time NIST has been underfunded. Regardless of which yardstick is used to assess the appropriate level for NIST funding, the same conclusion is reached --- a serious deficiency exists. The proposed budget for fiscal year 1992, and the increases planned for the future are certainly a welcome beginning.

I also applaud the efforts of this committee and its Senate counterpart in attempting to support and enhance the research, services, and outreach programs of NIST. NIST is extremely effective at contributing to, and indeed providing, essential components of the technical base for U.S. industry; a technical base on which industry relies. It is the only laboratory of its kind in the country, even the world.

Science and technology are commonly recognized as central elements in U.S. economic competitiveness and national security. In the last 15 years, the U.S. gross national product has shown real growth of more then 50 percent. In that same period, U.S. industry has increased its research and development funding by more than 80 percent in constant dollars. Federal R&D spending has had real growth of more than 50 percent over the same period. Both industry and government have made this investment because our national economic strength and our national security have relied more and more heavily on technology.

On the other hand, NIST, which targets its research and services on the most important elements of our industrial R&D and which supports the entire economy, has had zero real growth over those years. However, the increases given NIST in FY 1991, as well as the budget request for NIST in 1992 and the increases planned through 1996 are good steps in the right direction.

The fiscal year 1992 budget request for NIST includes $22 million for new and expanded intramural research.

NIST's request in electronics will provide funding for the accelerated development of measurement technology and standards for high-temperature superconductors, semiconductors, and advanced microwave and fiber optic communications systems. This research will provide the needed measurement support and technology assistance an embattled, but still strong, U.S. electronics industry needs to compete against aggressive international competitors.

The request in manufacturing technology will address fundamental problems faced by industry in developing a new generation of intelligent machine systems. The increases will also provide for expanded work in crafting international standards for the digital exchange of product data. Both are critical to U.S. competitiveness.

With respect to exchange of product data, Ford has been following closely NIST'S program on Product Data Exchange Specification(PDES). This project, when completed, will allow software vendors to provide software products capable of supporting product development, product manufacturing, product field maintenance, and product financial reporting with commodity software products, in much the same way we enjoy commodity word processing programs today. The potential increase in efficiency and responsiveness is enormous.

Additional initiatives will provide for work in the synthesis and processing of materials, for chemical measurements, for expanded research on computer security and integrity, for the collection of data needed to help develop alternatives to chlorofluorocarbons, and for the development of safety practices and standards for lifeline systems during earthquakes. And most importantly, the budget will provide funding to begin the critically needed refurbishment of NIST's Gaithersburg and Boulder Laboratory facilities.

Ford's materials research activities, as well the Automotive Composite Consortium(Ford/GM/Chrysler), have been very active in joint projects with NIST.

NIST'S work in developing robust models for liquid molding of composites, low-cost sensors for process control, and practical methods for non-destructive evaluation of composites is very relevant to the long-term needs of industry. NIST's interest in industry's needs and their to commitment to technology transfer makes their industrial liaison efforts a model that should be emulated by other Federal laboratories.

I believe no item in NIST's budget is more important to the long-term health and effectiveness of NIST than upgrading and modernizing its laboratory facilities. Industry and academia are dependent on NIST for high-quality, extremely precise measurements, and cutting-edge technologies. Reliable, state-of-the-art environmental controls, adequate heating, cooling and electrical service, and safe physical environment are essential if NIST is to remain a world-class research laboratory.

I want to make clear at this point that when I talk about the need for doubling the NIST budget I am referring to its in-house, laboratory-based research and services. The first priority is to provide NIST with the resources required to allow it to continue to be a world-class laboratory in support of U.S. industry and government. This research base must be strong enough to support all of the other extended and expanded missions, or those new missions will surely crush the very capability which led policy makers to establish NIST in the first place.

The new programs assigned to NIST by the Technology Competitiveness Act of 1988 address problems of national concern. It is well acknowledged that we are good in science and generic technology, but poor in implementing this technology base into commercial manufacturing processes and products. Most of the responsibility for improving technology transfer lies clearly at the feet of industry. For several years we -- as a nation -- have been debating how to improve this process, but no one that I know of has come up with a magic solution. Some proposals have called for aggressive, new government-industry interactions, while others have called for restructuring of agencies or the creation of new ones. The central point is that even if we wanted an industrial policy, we just do not know what would work in any case. Rather than discussing industrial policy, we should be evolving a national technology policy. I don't know exactly what that policy should encompass, but I do know that government and the private sector should not view each other as adversaries with opposing goals.

I also know that we do not have to reinvent the wheel. NIST, particularly with its strong base in science and engineering, and its new extramural research support and technology outreach programs -- the advanced technology program and the manufacturing technology centers -- continues and grows in the role of supporting industrial competitive needs. It serves as a focal point for government efforts to increase our nation's industrial competitiveness.

The regional centers for the transfer of manufacturing technology are proving a sound concept. NIST has emphasized hands-on experience in these centers and a partnership with academic institutions, particularly community college and vocational schools, to train workers for automated manufacturing firms which seems particularly appropriate.

Even though the assignments related to the advanced technology program are a relatively new venture for NIST, NIST's technical competence, its unquestioned integrity, and its extensive knowledge of and interactions with industry, universities, and government make it a natural choice for formulating, starting up, and operating this new program. It is my understanding that NIST has completed the first round for evaluating proposals for funding under the ATP, and that Dr. Lyons expects to announce the first awards shortly.

In summary, Mr. Chairman and members of the Committee, let me reiterate:

- First, I believe that the NIST intramural research program is a national jewel on which industry justifiably relies. The first priority of the committee should be to support NIST's in-house research and services at a level substantially higher than it has been supported in past years.

- Second, I believe that the expansion and extension of the NIST mission into technology transfer and more general support for civilian industrial technology development are worthwhile. However, any new NIST assignments must also be accompanied by adequate new resources, not at the expense of the laboratory based programs.

Thank you for the opportunity to appear before you this morning. I will be happy to answer any of your questions.

BIOGRAPHY: Dr. John P. McTague

Dr. John P. McTague is vice president - Technical Affairs for Ford Motor Company, effective March 1, 1990. He directs the operations of Engineering and Manufacturing Staff, Research Staff, Environmental and Safety Engineering Staff and Project Alpha. He previously had served, since June 1986, as Ford's vice president - Research, and prior to that had been Acting Science Advisor to the President of the United States. On February 2, 1990, Dr. McTague was appointed by President Bush to his Council of Advisors on Science and Technology (PCAST).

A physical chemist, Dr. McTague was appointed deputy director of the Office of Science and Technology Policy in 1983, becoming its acting director in 1986. OSTP advises the President on ways to implement new developments in science and technology most effectively for national security and welfare.

Dr. McTague earned a doctorate from Brown University in 1965. He was a member of the North American Rockwell Science Center in Los Angeles from 1964 to 1970. He then joined the chemistry faculty of the University of California at Los Angeles, where he also was a member of the Institute of Geophysics and Planetary Physics. During 1982-83 he was chairman of the National Synchrotron Light Source Department at the Brookhaven National Laboratory in New York and an adjunct professor of chemistry at Columbia University.

He is a member of the Secretary of Energy Advisory Board, and is U.S. Co-Chairman of the U.S.-Japan Joint High Level Advisory Panel on Cooperation in Research and Development in Science and Technology. He serves on the board of directors of Argonne National Laboratory and on numerous academic visiting committees.

Mr. VALENTINE. Thank you, Dr. McTague.

Mr. O'Grady?

STATEMENT OF JOSEPH G. O'GRADY, PRESIDENT, AMERICAN SOCIETY FOR TESTING AND MATERIALS, PHILADELPHIA, PENNSYLVANIA

Mr. O'GRADY. Thank you, Mr. Chairman.

I'd like to say good morning to the members of the committee and the ladies and gentlemen. My name is Joe O'Grady. I am the current president of ASTM, an organization of 34,000 members that develops some interesting kind of document that I'll describe in just a minute.

ASTM is a not-for-profit corporation. It is the leading standards organization for the world for the development of voluntary consensus standards for products, systems, and services, to say nothing of our most important thing, which has to do with basic materials.

We produce and maintain some 8,500 standards. The voluntary consensus standards of ASTM are documents of national and international trade. It is the language by which the buyer and the seller come together to agree upon a set of conditions whereby products are bought and sold in the marketplace. These standards cover a wide variety of subjects, of some which I mention, and they include, among other things, petroleum products. They include biotechnology standards and other types of standards which have become more important as time goes on.

ASTM is recognized in the world for the quality of its documents, and why is that? It is because there is a confederation of industry, academia, government, and consumers who collectively support the system and work in the 135 technical committees to produce these documents of trade which are used nationally and internationally, as I said before.

The NIST research, the NIST technological product, is a fundamental ingredient in many ~~of the~~ ASTM standards. We have more than 200—perhaps close to 250—scientists and experts from NIST who support and work within the technical committees and export the technology developed in the NIST complex into the voluntary consensus standards of ASTM that get used throughout the world.

So it is, in a sense, a way of exporting U.S. technology not only from what comes out of NIST, but what comes out of the other research facilities in the ASTM system, the industrial complex, academia, and the consumer interest groups, as well.

So we do have an abiding interest in NIST, and we have had that for a great many years, and it is because of the relationship between ASTM and NIST that I am very pleased to be able to come here every now and then to address this committee and to encourage—indeed, plead with you—to support the budgets of this grand organization who has done so much not only for ASTM, but industrial organizations such as my colleague over here has just described and thousands of others. And their plans for the future will expand upon that base, will make it better. It will make it more significant, in my opinion, for the development of competitiveness which will work its way into the private sector, and in so doing enhance and draw considerable benefit to all Americans. I would say these projects clearly serve the public interest.

I have selected on this occasion to depart almost completely from what I had been prepared to say because this document is in the records, but there is an uncountable number of activities that ASTM is involved with in that is benefitted by the input we get from NIST.

And I have one other little observation that I would like to make. I'll choose to read this. "NIST is performing valuable services in other areas. It is almost impossible to go through a day here or anywhere without hearing about Europe or the 'EC-1992' initiatives." As you know, the European Community is currently engaged in developing standards for products marketed within the community. These standards, which I'm sure you know, are called "EuroNorms," and in many cases will have the force of law when they are incorporated in and implemented by the European product directives.

American manufacturers, as you well know, are concerned about these standards because, depending on their content, they have the potential to exclude products of U.S. manufacturers—the potential to exclude products. American manufacturers are seeking ways to have meaningful input into the formulation of these EuroNorms so that their content will be consistent with U.S. products.

In order to accomplish this objective, manufacturers need timely, current information on standards under consideration by the European Community so that they can, to the extent possible—they, the manufacturers—can influence their content in much the same way as the manufacturers can influence the content of the ASTM standards or anybody else's standards in the world.

NIST has traditionally maintained and published a complete inventory of EC standard-setting organizations and their standards. We understand that NIST now proposes to expend this database to include information on draft standards which will enable interested and affected U.S. manufacturers to find out about and to comment on proposed or draft EuroNorms before they are adopted.

We believe such a service will be of great importance and benefit to the U.S. business community. It is my understanding that NIST, in the pursuit of this budget and in pursuit of support of American industry, is getting ready to make available to American industry a source of information on the European standard situation, which, while it exists now in limited form, it is my understanding that this will compliment — indeed, perhaps be the most important focal point for American industry to get the information that they require.

Well, ladies and gentlemen, I would just like to conclude by saying that Doctor Lyons, in his comment, talked about in terms of the mission of NIST, the generation of technology, the increased use of technology of a varying kind and new kinds as they come along.

ASTM sees that to be an important ingredient in the future of ASTM because, through our standards process, we export technology to virtually all other parts of the world in terms of standards which are used as documents of trade. So when the standards of use reflect American technology, which is what this is all about, we are on the right track.

So I would encourage you, in just a summary statement, Mr. Chairman and members of the committee, to consider seriously all of the good things that have been said about NIST today and yesterday, and I strongly recommend to the committee that they adopt the recommended budget for NIST.

Thank you, sir.

[The prepared statement of Mr. O'Grady follows:]

STATEMENT OF JOSEPH G. O'GRADY, PRESIDENT
OF
ASTM

ON THE

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
FY 1992 BUDGET REQUEST

MR. CHAIRMAN, MEMBERS OF THE SUBCOMMITTEE, LADIES AND GENTLEMEN--GOOD MORNING. MY NAME IS JOSEPH G. O'GRADY, PRESIDENT OF ASTM.

I WOULD LIKE TO STATE A FEW THINGS ABOUT ASTM TO LAY THE GROUND WORK FOR WHY WE ARE MAKING THIS STATEMENT FOR THE RECORD.

ASTM, A NOT FOR PROFIT CORPORATION, IS THE LEADING STANDARDS ORGANIZATION IN THE WORLD FOR THE DEVELOPMENT OF VOLUNTARY CONSENSUS STANDARDS FOR MATERIALS, PRODUCTS, SYSTEMS, AND SERVICES. ITS STANDARDS WRITING COMMITTEES ANNUALLY PUBLISH NEARLY 8,500 STANDARDS TO MEET THE NEEDS OF INDUSTRY, GOVERNMENT, ACADEMIA, AND OTHERS IN THE PRIVATE AND PUBLIC SECTORS OF OUR ECONOMY. ASTM STANDARDS COVER A WIDE SPECTRUM OF SUBJECTS--FROM BASIC MATERIALS SUCH AS METALS, PETROLEUM, AND TEXTILES, TO SOPHISTICATED SYSTEMS SUCH AS FIRE HAZARD ASSESSMENT, MEDICAL

SERVICES, BIOTECHNOLOGY, AND CONSUMER PRODUCTS. SINCE 1898, WHEN ASTM WAS FORMED, ASTM STANDARDS HAVE BEEN WIDELY USED AND WIDELY RECOGNIZED THROUGHOUT THE WORLD AS THE MOST CREDIBLE, CURRENT, TECHNICALLY SOUND CONSENSUS DOCUMENTS AVAILABLE.

BOTH NIST AND ASTM WERE FOUNDED TO HELP DEVELOP A FIRM TECHNOLOGICAL BASE FOR THIS COUNTRY'S INDUSTRIAL REVOLUTION AT THE TURN OF THE CENTURY. BOTH ORGANIZATIONS HAVE EXPERIENCED REMARKABLE GROWTH OVER THE YEARS AND HAVE DEVELOPED A WORKING RELATIONSHIP THAT HAS BEEN MUTUALLY SATISFACTORY AND PRODUCTIVE. WE OFFER OUR VIEWS TO THIS SUBCOMMITTEE ON THE IMPORTANCE OF THE MANY VALUABLE PROGRAMS OF NIST BECAUSE WE BELIEVE THESE PROGRAMS CONTINUE TO PROVIDE IMPORTANT SUPPORT FOR THE COMMON TECHNOLOGICAL GOALS OF THE PUBLIC AND PRIVATE SECTORS IN THE U.S.

PERHAPS OF GREATEST IMPORTANCE TO ASTM IS THE FACT THAT THE WORK OF NIST PROVIDES RESEARCH AND TECHNOLOGY, UPON WHICH MANY ASTM STANDARDS ARE BASED. ASTM PRODUCES NEARLY 8,500 STANDARDS; MORE, WE BELIEVE, THAN ANY OTHER ORGANIZATION IN THE WORLD. THE INTEGRITY OF THESE DOCUMENTS IS RECOGNIZED IN EVERY CORNER OF THE GLOBE. ASTM'S WORK WOULD BE MATERIALLY HURT WITHOUT THE PARTICIPATION OF THE ALMOST 250 SCIENTISTS AND ENGINEERS OF THE INSTITUTE IN THE WORK OF OUR TECHNICAL COMMITTEES AND WITHOUT THE BASIC RESEARCH, REFERENCE MATERIALS, AND ADVANCED MEASUREMENT TECHNIQUES WHICH NIST HAS DEVELOPED AND SHARES WITH US.

LET ME SHARE WITH YOU A FEW EXAMPLES OF HOW NIST HAS CONTRIBUTED TO OUR WORK AND, THROUGH US, TO THE ADVANCEMENT OF U.S. INDUSTRIAL OBJECTIVES.

NIST HAS RECENTLY SUPPORTED AND PARTICIPATED IN A GLOBAL INTERLABORATORY TESTING PROGRAM SPONSORED BY THE ASTM INSTITUTE FOR STANDARDS RESEARCH DESIGNED TO VALIDATE AND RECONCILE DIFFERENT FIRE TEST METHODS USED IN DIFFERENT PARTS OF THE WORLD. THE RECONCILIATION OF THESE TEST METHODS AND THE RESULTS THEY PRODUCE WILL ENABLE U.S. MANUFACTURERS LOOKING TO MARKET THEIR PRODUCTS IN EUROPE AND OTHER REGIONS OF THE WORLD TO DO SO WITHOUT FACING DIFFERENT TESTING REQUIREMENTS IN EACH DIFFERENT EXPORT MARKET.

LET ME GIVE YOU ANOTHER EXAMPLE. NIST HAS DEVELOPED A NEW TEST INSTRUMENT WHICH CAN BE USED TO PROVIDE CRITICAL DATA ON THE FIRE HAZARD OF SPECIFIC PRODUCTS. THE CONE CALORIMETER WILL CONTRIBUTE TO A FULLER UNDERSTANDING OF PRODUCT PERFORMANCE USING SMALL SAMPLES OF THE INVOLVED MATERIALS. THIS NEW TECHNOLOGY IS

NOW BEING CONSIDERED IN ASTM COMMITTEE E-5 ON FIRE STANDARDS AND THE ASTM CONSENSUS STANDARD EXPECTED TO RESULT WILL TRANSFER THIS TECHNOLOGY, GENERATED AT NIST, TO THE MARKETPLACE, AND CONTRIBUTE TO INCREASED PUBLIC SAFETY.

I COULD CITE TO YOU ALMOST INNUMERABLE EXAMPLES OF HOW NIST'S RESEARCH EFFORTS HAVE CONTRIBUTED TO IMPROVING THE QUALITY AND PERFORMANCE OF U.S. PRODUCTS AS WELL AS THEIR SAFETY. IN THE ROOFING MATERIALS AREA, FOR EXAMPLE, NIST RESEARCH IS SUPPLYING VITAL INFORMATION FOR ONGOING STANDARDIZATION ACTIVITIES. TESTING CONDUCTED AT NIST LABORATORIES ON PUNCTURE TESTING AND SEAM PERFORMANCE OF NEW ROOFING MATERIALS AND SYSTEMS HAS CONTRIBUTED TO THE IMPROVEMENT OF SEVERAL EXISTING STANDARDS AND THE DEVELOPMENT OF NEW SINGLE PLY ROOFING SPECIFICATIONS IN COMMITTEE D-8 ON ROOFING.

These are just a few examples of NIST technical/research contributions. I could add an endless list of others in the areas of Degradable Plastics, Advanced Ceramics, Non-destructive Testing, Thermal Insulation, Building Economics and so on.

NIST is performing valuable services in other ways. It is almost impossible to go through a day without hearing the phrase "EC-92". As you know, the European Community is currently engaged in developing standards for products marketed in the Community. These standards (called EuroNorms) will, in many cases, have the force of law because they will be incorporated in, or will implement, EC product directives. American manufacturers are concerned about these standards because, depending on their content, they have the potential to exclude products of U.S. manufacturers.

American manufacturers are seeking ways to have meaningful input into the formulation of the new EuroNorms so that their content will be consistent with U.S. products. In order to accomplish this objective, manufacturers need timely, current information on standards under consideration in the EC so that they can, to the extent possible, influence their content. NIST has traditionally maintained and published a complete inventory of EC standards-setting organizations and their standards. We understand that NIST now proposes to expand this database to include information on draft standards which will enable interested and affected U.S. manufacturers to find out about, and to comment on, proposed or draft EuroNorms before they are adopted. We believe that such a service will be of great importance and benefit to the U.S. business community. The ability of U.S. manufacturers to prevent the exclusion of their products may depend in great measure upon

THEIR GETTING THEIR INPUT INTO THE CONTENT OF THE NEW EURONORMS PRIOR TO THEIR ADOPTIONS.

I HAVE CITED ABOVE JUST A FEW OF THE WAYS IN WHICH NIST CONTRIBUTES TO THE SUCCESS OF OUR COUNTRY'S INDUSTRY. U.S. INDUSTRIAL COMPETITIVENESS IN THE 90'S WILL BE DEPENDENT UPON THE EFFECTIVE TRANSFER OF TECHNOLOGY INTO THE MARKETPLACE. NIST IS UNIQUELY POSITIONED TO ADVANCE THIS OBJECTIVE THROUGH RESEARCH, TECHNICAL CONTRIBUTIONS, PARTICIPATION IN THE PROMULGATION OF STANDARDS WHICH ARE USED WORLDWIDE AS BOTH TECHNOLOGY BENCHMARKS AND DOCUMENTS OF TRADE, AND THE FLOW OF CRUCIAL INFORMATION TO AMERICAN BUSINESS.

WE ARE HAPPY TO SEE THE HIGH LEVEL OF CONGRESSIONAL COMMITMENT TO THE SCOPE AND PURPOSES OF NIST BY THIS SUBCOMMITTEE. IT WILL BE

THROUGH YOUR EFFORTS AND DEDICATION THAT U.S. INDUSTRIAL OBJECTIVES ARE ADVANCED.

NOW, I WOULD BE PLEASED TO ANSWER ANY QUESTIONS YOU MAY HAVE.

Mr. Valentine. Thank you. We thank all of you very much for the preparation that went into this appearance and for sharing these words of wisdom with us.

We do mean business. I am a little cog in this apparatus. The chairman of this committee, Mr. Brown, is dedicated to seeking, with all of his strength and considerable capacity, an answer to the question that we also are concerned with and about. And we think that we sense a change in the attitude of other people with responsibility in the government in the Executive Branch. If we misread that, then I am—I think that's what Mr. Prestowitz was saying to us. If the correct attitude is not there on the part of others who share responsibility, then we won't get very far.

I wanted to ask you, Mr. Prestowitz: do you believe that there are laws in place to correct the problems that you recited having to do with these small companies in California? Or do the people who work in the Executive Branch need new tools to be able to do the job?

Mr. Prestowitz. I don't think they need new tools. I think the tools are all there; it is just a matter of using the tools that are there.

Mr. Valentine. Yes. Well that's—do you—

Mr. Prestowitz. You know, it is interesting. I happened to be reading a report last night which bears on this. Towards the end of the second world war the United States was behind Europe in radio telegraphy technology, and the U.S. Government became concerned about this and RCA— Radio Corporation of America—was actually established at the behest of the Navy, which not only persuaded General Electric and AT&T to establish the company, but the Navy actually invested and the U.S. Government owned 20 percent of RCA when it was originally set up, and the purpose of setting it up was not to do basic research. It was not to do generic precompetitive research. It was to apply technology and to achieve leadership in a commercial technology for the United States.

Now, there is nothing stopping the U.S. government from doing what it did in 1918 if it wants to.

Mr. Valentine. Are you able to tell us whether or not you notice any change in attitudes over the past year or two years.

Mr. Prestowitz. Well, this is a little bit—

Mr. Valentine. Since you wrote your book.

Mr. Prestowitz. This is a little bit like Kremlinology. You know, you look at who stands next to whom in the receiving lines and that kind of thing. I would say I think that I don't really see any significant change. I think Alan Bromley is doing yeoman-like work at OSTP, and I hope he continues it, and he has been able to slide some things through that, frankly, I was surprised he was able to get through.

But, you know, we are in a situation where—Eric Bloch gave a speech recently, and he said that—he mentioned the publication of OSTP called "The U.S. Technology Policy," and he said to the audience that if you don't bother to read the document because there is nothing in it, but the significance of the document is the cover page which says "U.S. Technology Policy." In other words, it is significant that the U.S. Government is prepared to say that we have a policy. That's the stage you are at in kind of measuring progress.

I would say in many respects we have gone backwards from the time I wrote my book. Certainly our economic performance has continued to erode. Our technological position has continued to erode.

One of the champions of U.S. technology performance, Tom Murrin, the deputy secretary of Commerce, resigned in frustration.

So, you know, you have some people who are doing yeoman- like work like Alan Bromley, but they are isolated, and after a while they get tired, as Tom did, and they—you can't expect them to beat their head against stone walls forever. So I would really say I don't see any great change.

Mr. VALENTINE. Dr. McTague, what do you think are the most important steps that NIST can take to increase competitiveness?

Dr. MCTAGUE. I think the most important thing that NIST can do is to continue to develop its core programs, the reasons that the old National Bureau of Standards was founded. As Mr. O'Grady mentioned, the standards activities and the underlying technologies required for them have an enormous impact on our ability to compete, especially in view of "EC- 92" and the uniformity that is occurring within Europe and the potential danger of alternate standards affecting the ability of us to export products.

The new programs that NIST has undertaken, the advanced technology program and the manufacturing technology centers, as I mentioned, I believe are important experiments that are important, as much as anything else, from a symbolic reason, something that Mr. Prestowitz was talking about. It is one of the first steps of attempting to have a partnership relationship as opposed to an adversarial regulatory relationship between U.S. industry and government.

I don't know whether these are the right answers, but I think the experiments are worth doing. I believe the initial signs are positive, and if they continue to be positive they should continue to be supported in increased manner, but the base program of NIST has served the Nation extremely well for 90 years with rather limited resources, and the cost benefit says that it is well worth putting more money into that area.

Mr. VALENTINE. Mr. O'Grady, what do you think are the most important steps that NIST can take to increase competitiveness?

Mr. O'GRADY. Well, Mr. Chairman, I believe that, from what I have heard yesterday, today, and the statements I have read, I think the message to your committee is clear that you need to increase the effectiveness of NIST by allowing them to set in motion those things which were agreed to initially in the Omnibus Trade Bill of 1988, and you are embarking on that now.

So I think what needs to be done, Mr. Chairman, is already being done, and competitiveness is an extremely crucial issue for our competition in the world marketplace. It is no question about that. And I believe that we are on the right trail by enhancing and augmenting the ability of NIST to generate a variety of new technologies which will wind into the marketplace either through the standards process of ASTM, the standards process of some other organization, but in all cases to develop documents which will be used as instruments of trade, and I believe in that way the competitiveness will most certainly be enhanced.

Mr. **Valentine**. Thank you.

Mr. Thornton?

Mr. **Thornton**. Thank you, Mr. Chairman.

I am concerned not about the importance of providing the funding that is requested, because I do support the request, but I want to ask about some of the initiatives which are not included in the budget request and ask if perhaps they are taken care of in some other activities under different names or different labels, or if there has been a policy change with regard to the advisability.

In particular, the areas are the State technology extension program, patterned after the agriculture extension programs; the non-energy-related inventions programs; the regional manufacturing centers. And the reason I ask the question is that I have thought on occasion that there is a tendency to think that you don't really get much advantage by spreading the knowledge base and the innovative base throughout the country, that it should gravitate quickly and easily to the areas which are already doing exceedingly well, and that's the reason a few years ago that we started a program in NSF called EPSCR, Experimental Program to Stimulate Competitive Research. Doctor Adkinson and I hammered that out as a result of an effort to continue peer review, but yet to stimulate research in other areas.

And I wonder if that kind of approach isn't important here, as well. Isn't it important to make sure that we do have a wide-ranging effort to stimulate competitiveness?

Dr. **McTague**. Mr. Thornton—

Mr. **Thornton**. All three of you.

Dr. **McTague**. It was very interesting that you brought up the EPSCR matter because I, in fact gave a talk about this in Japan in January. I am not a particular supporter of the notion that I am from the government, I'm here to help you, and I suppose that when the EPSCR program was originally proposed, if I had been involved in science policy at the time I would have opposed it. I am older and not wiser but humbler. It has been a success. It has been a success not because it gave money to the have-nots—

Mr. **Thornton**. Right.

Dr. **McTague**.—but because it was done in such a way that it picked out areas and even individuals where it was clear that there was a good odds that if you put in a little seed money you would get an advantage in the end. That was an experiment that succeeded.

Mr. **Thornton**. Right.

Dr. **McTague**. As I said, I believe we should be trying a lot of experiments, and I don't believe anybody knows the answers as to what should work.

Whether the particular programs that you mentioned would have been winners with substantial support, I don't know, but my inclination is to try experiments.

Mr. **Thornton**. Well, I agree with that. I think—but when you do find an experiment that is having a good effect, use it as a pattern or model for others. Is that—would you agree with that, sir?

Dr. **McTague**. I absolutely agree with it, Mr. Thornton.

Mr. **Thornton**. I also think it is important to recognize that we have to overcome the tendency to fragment solutions because of the structures of government, the structures of Congress, the structures of the Federal Government in which we proceed along trails which are isolated from each other. I am reminded of Francis Bacon's statement in "Novum Organum" where he said that it would be unsound and contradictory to suppose that that which has never been accomplished can be accomplished except by means which have not yet been tried, and it may be time for us to try to develop some new mechanisms for crossing boundaries within government, because the problem we have is not going to be addressed simply by the result of action of this committee, though this is really a focal point of developing our competitiveness. It is going to require wide-ranging thought.

Mr. Prestowitz, it seems to me that you have addressed that quite a bit in your writings.

Mr. **Prestowitz**. Yes, I have, and I couldn't agree more that the fragmentation, both of the Congress and of the Executive Branch, makes it difficult to achieve coordination of policy in the government and makes it very difficult to achieve any focus between the government and industry. And I wholly agree that, with the reference to Bacon, although I must say that very often it seems to me that we are victims of a kind of a latter day orthodoxy. If we really would just dust off the pages of our own history, we did manage to set up RCA. We did manage to set up the NACA to achieve leadership in aerospace, and I don't know why we can't remember and do it again.

Mr. **Thornton**. If you'll permit me a personal reference, my grandfather taught me as a child that there were three ways that human beings could gain knowledge. One he said was by reading and study. He said that's the preferred method. Histories have been written in order to let people avoid making the mistakes of the past. He then said the next is by observation and reflection. One can look at a situation, observe results, and project from that to a conclusion. That, I think, is the nature of scientific experimentation. The third method Papa outlined was one could learn from experience, but he said the trouble with learning from experience is you get it from not having it for what you needed it for. And it seems to me that in many instances we as a Nation learn from experiences the same lesson over and over again, just as we did with regard to energy.

I didn't mean to make a speech. I'm supposed to be asking questions. Do you all agree, Mr. McTague?

Dr. **McTague**. How could I disagree?

Mr. **Thornton**. Mr. O'Grady?

Mr. **Gilchrest**. Yes, Mr. Thornton, I agree, as well. I realize that I'm here to discuss and to interact with the committee in terms of the NIST budget, and this is not directly related, though I think it is an important story briefly.

One wonders, as we travel in ASTM throughout the world in pursuit of our standards activities, why is it that there are certain organizations in the world—and I'll specify one in Germany. The German Standards Organization gives their standards away. They give money away. They are interacting with other nations of the world in a very vigorous fashion. And from the ASTM perspective, where we survive on the basis of our standards sales and books and other types of technical information, one wonders how the Germans can do that until you look beyond the standard system of Germany and realize that the standard system of Germany has not been set up to sell documents. The German Standards Organizations have been set up to make German industry succeed.

And the other side of that issue is the fact that the German government, the Japanese government, or any of the other governments, have a primary mission in life to make their industries succeed.

So I thought I would leave that little thought with you.

Mr. THORNTON. Mr. Chairman, I yield back the balance of my time.

Mr. VALENTINE. Thank you.

Thank you all very much for this contribution. We will afford, as I have stated, other members of the subcommittee the opportunity to send some questions to you if they desire. I would appreciate your attention to those at the appropriate time.

If there is no other business, the subcommittee stands adjourned.

[Whereupon, at 12:17 p.m., the subcommittee adjourned, to reconvene at the call of the Chair.]

APPENDIX

The American Society of Mechanical Engineers

Suite 218
1825 K Street, N.W.
Washington, DC 20006-1202
202-785-3756

March 12, 1991

The Honorable Tim Valentine
Chairman
Subcommittee on Technology
  and Competitiveness
Committee on Science, Space,
  and Technology
U.S. House of Representatives
B-374 Rayburn House Office Building
Washington, D.C. 20515

Dear Chairman Valentine:

The ASME/NIST Interaction Committee of the American Society of Mechanical Engineers respectfully requests to submit the attached statement in the record of the House Subcommittee on Technology and Competitiveness hearing held on February 26, 1991 regarding the NIST FY 1992 proposed budget authorization.

Should you have any questions concerning this statement, please contact Pamela Roznoy in our ASME Washington Office at (202) 785-3756. We thank you in advance for your attention to this matter.

Sincerely,

Lawrence Kennedy

Lawrence Kennedy
Chairman
ASME/NIST Interaction Committee

Enclosure

The American Society of Mechanical Engineers

Suite 218
1825 K Street, N.W.
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202-785-3756

Statement by the

ASME/NIST Interaction Committee
of the
Council on Engineering
of the
American Society of Mechanical Engineers

on the
National Institute of Standards and Technology
FY 1992 Budget Request

Submitted to the
Subcommittee on Technology and Competitiveness

of the
Committee on Science, Space, and Technology

United States House of Representatives

March 12, 1991

The ASME/NIST Interaction Committee of the American Society of Mechanical Engineers (ASME) appreciates the opportunity to present our views through this written statement to the House Subcommittee on Technology and Competitiveness regarding the Bush administration's FY 1992 budget request for the National Institute of Standards and Technology (NIST).

In this era of rapid technological change, NIST and ASME maintain a synergistic relationship that benefits the engineering profession and the nation. As part of the Technology Administration, and as charged by the Omnibus Trade Act of 1988, NIST has extensive responsibilities to improve U.S. competitiveness through increased research and development of advanced manufacturing technologies, more effective technology transfer from federal labs, and improved measures and standards development.

Founded in 1880, ASME's membership of 118,000 engineers, which includes 21,000 students, practices many applications of engineering. As a result, we have a strong and continuing history of interest in both the immediate and long term direction of NIST and have an established ASME/NIST Interaction Committee to coordinate the society's activities in this area. Because of the recognized relationship between NIST and ASME, this testimony will focus only on selected aspects of the FY 1992 NIST budget, rather than the complete Technology Administration budget proposal. This statement was prepared by the ASME/NIST Interaction Committee and represents the consensus of this group rather than an official position of ASME.

As the nation's primary research laboratory charged with developing certain measurement and quality control standards, NIST plays an important role in promoting technology transfer and utilization. In particular, we refer to NIST's continuing technical programs and those programs related to emerging technologies, as well as the relatively new extramural NIST activities, the Advanced Technology Program (ATP) and the Manufacturing Technology Centers (MTC). We hope these efforts to improve technology transfer and strengthen U.S. industry, through both ongoing and recently-initiated programs, will be continued and enhanced. We are especially pleased that, unlike previous proposals, this budget request would fund the ATP and MTC on their own merits, with no question of expense to existing core programs.

The President's budget request for NIST represents well deserved and long overdue recognition for the agency. The White House's drive to nearly double NIST's budget by FY 1996 is a crucial push toward improving U.S. competitiveness.

We support the FY 1992 budget request of $248 million, a 15 percent ($33 million) increase over the FY 1991 appropriation of $215 million. Congress needs to insure that these funds are made available to NIST if we are to use the agency's unique resources to support more strongly U.S. industrial competitiveness. Continued financial investment will enhance efforts started in FY 1991 to expand NIST's ability to develop generic technology, as well as adequately address an ever-increasing number of important standards and measurement issues.

Facilities Retrofit

Without adequate facilities, NIST will be unable to maintain its extraordinary rate of success. To support NIST's technology development and measurement research agenda, the Institute's 25- and 35-year-old facilities are in desperate need of refurbishment. The FY 1992 budget request includes $4 million to begin correcting safety and environmental problems and to upgrade inadequate heating, cooling, and electrical systems.

Intramural Research Programs

The general increase to $201.8 million for NIST intramural research programs includes increases for several key initiatives. The following outlines several research areas at NIST of particular interest to ASME. However, please do not interpret this to mean that the areas we do not address are not important for the continued success of NIST activities.

- **Manufacturing Engineering** - We applaud the 52.6 percent increase to $12.6 million for these programs. The U.S. mechanical engineering industry is supported by NIST's research and measurement services to create a modern automated manufacturing environment. With almost half the U.S. trade deficit in this industrial sector, efforts to develop standards and measurements for on-line quality control during manufacture, improved design communication between different manufacturers, and control systems for robots and automated production are essential. The program dealing with concurrent engineering provides necessary bridging between product design and manufacturing and is important to pursue.

- **Chemical Science and Technology** - This area is targeted for $20.8 million, an 11.8 percent increase over last year's funding. We support these additional investments which will go toward improving chemical measurements and standards which can currently cost high-technology industries as much as five times more than those using traditional technology.

- **Materials Science and Engineering** - We endorse the proposed 8.2 percent increase to $28.6 million for the materials science and engineering area. These funds will enable NIST researchers to strengthen current measurement technologies and develop the necessary generic technology base to measure the performance of and establish standards for intelligent materials processing.

- **Computer Systems** - We endorse the proposed budget request of $15 million in this area to allow current NIST research to comply more fully with the Computer Security Act of 1987 and to develop methods to protect against harmful computer software and "viruses." The increase includes $1.65 million for work already begun on an Integrated Services Digital Network (ISDN) to allow simultaneous transmission of text, voice, images, and data over telephone lines.

- **Building and Fire Research** - In previous years this program area has faced the threat of zero funding. However, the FY 92 budget proposes an 8.3 percent increase of the base program funding to $10.6 million. We support the reorganization of this program and the planned concentration on standards and safety.

Extramural Programs

We are concerned with the status quo or decrease in funding proposed for both NIST extramural programs, the Advanced Technology Program (ATP) and Manufacturing Technologies Centers Program (MTC). Through these unique programs, U.S. companies share the financial risks of developing and implementing new manufacturing technologies with the federal government.

The proposed funding for ATP of $35.9 million is equal to last year's appropriation. Although this $35.9 million is a minority share of the industry-led program, the goal of ATP, to support high-risk research and development on pre-competitive, generic technologies, is crucial and the program deserves an appropriate funding level. We applaud this Committee's leadership role in support of ATP in the American Technology Preeminence Act the House passed last year. The ATP funding levels of $100 million included in that bill need to be considered again.

MTC is earmarked to receive $10.3 million, a 13.5 percent decrease over the FY 1991 level; however, $3.4 million from FY 1991 will be carried over for funding this program. This appropriation will support three existing centers, two more centers to be built with funds appropriated in FY 1991, and selection of a site for a sixth center in FY 1992. Although both ATP and MTC are still considered experimental, their wide popularity and generated interest from industry have sent a message of continued success.

Standards Activities

Last year, the ASME Council on Codes and Standards presented testimony at a NIST hearing and at a hearing of the Subcommittee on Science, Research and Technology on the federal government role in international standards. The Council recommended a stronger government role in support of U.S. standards and accreditation issues in negotiations with other governments. In this regard, ASME was pleased to cosponsor a NIST workshop in January on the government's role in ensuring the international acceptance of U.S. manufactured pressure vessels and to ensure proper recognition of American activities related to conformity assessment in international markets such as the European Community. A report of the workshop will be published shortly.

Government-funded support for U.S. international standards and related accreditation activities is needed. As international standards preempt domestic standards, the United States must play a more active role in financing the administration of U.S. technical advisory groups and the international secretariats. Also, the United States need to support the travel of U.S. representatives to international standards meetings when no other support is available. We recommend that $12 million be added to the NIST budget for these purposes.

In addition, we are working with NIST in their new responsibilities under the Fastener Quality Act to establish procedures for accrediting testing laboratories to determine if certain fasteners conform to the standards and specifications. We look forward to timely and effective implementation of the Act.

In closing, we would like to emphasize our support for a two-year budget authorization for NIST. This would allow for better long-term planning and eliminate much of the guess work that currently takes place during the yearly authorization proces. Long-range planning is critical to meeting many of the technological and competitive challenges that the U.S. faces today. We especially want to underscore our support for a long-term budget plan which will double NIST's budget by 1996. With the advent of the European community incorporating their markets into a single integrated entity by 1992, U.S. exporters will be facing the problem of dealing with differing national technical standards. This area will have an impact not only in the scope of the standards and measurements work at NIST, but in all of the competitiveness areas which we have outlined in this statement.

Thank you for the opportunity to present these views on the proposed FY 1992 budget for the National Institute of Standards and Technology.

National Conference of Standards Laboratories
1800 30th Street, Suite 305B • Boulder, Colorado 80301 • (303) 440-3339

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March 12, 1991

Mr. Jim Turner, Committee Staff
Subcommittee on Technology and Competitiveness
Committee on Science, Space and Technology
United States House of Representatives
Rayburn House Office Building #B374
Washington, DC 20515

Dear Jim:

It was a pleasure meeting with you last month and sharing with you our concerns for the future roles of NIST in the task of improving U.S. competitiveness in the world. Gary Davidson, Peter Lacy and I want to thank you for taking the time from your obviously busy schedule to see us.

Enclosed is the NCSL written testimony on behalf of the FY 1992 NIST budget. We have made reference to Dr. Lyons' paper on the strategic outlook for NIST in the 1990s of which we assume the Members have a copy. We recommend it as an excellent approach to the future of the Institute.

If you have any questions, please give me a call.

Sincerely,

Robert R. Smith

Robert R. Smith, Executive Vice President
National Conference of Standards Laboratories

Enclosure

NATIONAL CONFERENCE OF STANDARDS LABORATORIES
CONGRESSIONAL TESTIMONY ON THE
NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY FY 1992 BUDGET

The National Conference of Standards Laboratories (NCSL) is an organization of over 1100 metrology and calibration laboratories throughout the world but concentrated in the United States. These laboratories range in size from less than ten individuals to in excess of several hundred. They include both independent laboratories as well as those that are components of larger companies. Products included in the businesses represented in our domestic membership are as varied as the American economy but are predominantly in the electrical/electronic and measurement services sectors. Also included are laboratories of state and local government, educational institutions, and the federal government. They all have one overriding commonality: an interest in accurate and precise measurement. The testimony presented here is on behalf of the domestic, industrial (private sector) membership of the NCSL.

The NCSL strongly supports the budget proposal of the Administration and urges the Committee to consider cautiously any changes to it or to the goal of significantly increasing the authorizations and appropriations being planned for the next few years. We laud the support which this committee has provided the National Institute of Standards and Technologies in the past, in particular in those years when the Administration's proposals were less than what NCSL believed were minimally necessary. Nevertheless, we remain concerned about the need to maintain a balance between increased authorizations/appropriations and additional tasks. As may be recalled, our past concerns developed in no small way from Administration and Congressional expansion of NIST's responsibilities with little - or even no - increase in budget authority.

The appointment of Dr. John Lyons as Director of NIST, we believe, is beginning to breathe new life into all areas of NIST activities. His paper on the strategic outlook for NIST in the 1990's outlines what we feel is an outstanding plan for strengthening, upgrading, and expanding the vital role of NIST in its traditional functions as well as in its newer ones related to fostering the improvement of competitiveness of U.S. industry. Accomplishment of his objectives is essential, in our view, because if there is a single major issue facing the U.S. in this decade, it is that of competitiveness. With the active involvement of NIST and the Department of Commerce, U.S. industry simply must do better in moving good new ideas from the laboratory to production. Our competition in the past in the world has been from Japan and Germany and both have done better at this basic necessity than we have. In the recent past these two have been joined by others, notably South Korea. And in the next few years, beginning in 1992, our competition in the rest of Europe - through the creation of the EC92 trading block - is going to severely test our ability to compete in this ever-changing world.

During the recent war in Iraq, the American public - indeed the world - marveled at the vast array of technology employed by our armed forces in the Persian Gulf. The accuracy of our "smart" bombs and missiles, the remarkable success of the Patriot anti-Scud missile, and the less publicized - but nonetheless extraordinary - performance of our electronic countermeasures equipment, have been the wonders of the world. As noted in NCSL testimony two years ago, technology is an imperative in the world economy today. The achievements in the Persian Gulf would not have been possible without the measurement and quality assurance capabilities present in the defense sector. And they would have been impossible without the underpinning in measurement science and service provided by the National Institute of Standards and Technology. The dependence of the defense industry on NIST is matched by the need for such support by our non-defense sectors.

Although we strongly support all aspects of the Administration's proposed NIST budget for FY 1992, our membership continues to focus principal interest on what we believe is the Institute's core mission. As noted in the Omnibus Trade and Competitiveness Act of 1988, reaffirming what was envisioned in the original Organic Act of 1901, the mission of NIST includes the functions "to develop, maintain, and retain custody of the national standards of measurement, and provide the means and methods for making measurements consistent with those standards, including comparing standards used in scientific investigations, engineering, manufacturing, commerce, industry, and educational institutions with the standards adopted or recognized by the Federal Government."

The NCSL has testified for a number of years concerning NIST Budget Authorizations, noting significant lacks in capabilities in the core mission of NIST and emphasizing the increasing importance of the core mission to a growing number of industries in the U.S. At times we have been critical of the way NIST supported the vital core mission while at other times we praised what NIST was able to do for it with what seemed to NCSL to be an ever-diminishing share of the total NIST budget. We wondered whether NIST was requesting the needed funds from the DOC and OMB or whether these organizations, not directly on the firing line, were revising downward the NIST requests. We appealed to this Committee to increase the budgets proposed by the Executive Branch and were heartened when the Chairman and Members on both sides of the aisle spoke as one in support of the NIST core mission.

Philosophically, our membership believes that, as is the practice in most industrialized nations, development and delivery of measurement and standardizing services are rightly the province of the federal government. Development of new and improved measurement services should be funded by congressional appropriations as a public good; the cost of delivery of these services should be borne by the user of the service through a fee structure. In 1988 NIST was allowed to begin assessing a surcharge on all calibration fees; it was initiated at 8% of the fee and was scheduled to rise at 8% per year increments until it was at 40%. NIST has been directed by Congress to monitor the impact of the surcharge to assure that necessary use of NIST services was not reduced because of the change. It was intended that this concern be directed to small and medium size firms which use the calibration services of NIST and which, because of the increased price, might be forced to forego necessary calibrations.

The surcharge is now at 28%, having been allowed to rise only 4% in 1990. We believe the Congress should freeze the surcharge at the current 28% level until the cost impacts are able to be better absorbed by our member companies. The rate of the increases to date have far exceeded the rate of inflation and NCSL sees some evidence that companies are deferring NIST calibrations. The current surcharge is sufficient to develop funds for vital service upgrade and maintenance actions and freezing it at this level for awhile should not impair the continuing progress in this area.

As pointed out last year in the NCSL written testimony to this Committee, events in Eastern Europe and the impending changes in the West (EC92) noted above, create challenges for the U.S., economically and technically. The role of standardization laboratories in minimizing the potential for non-tariff trade barriers will take on added significance particularly for us and for our relationship with the European Economic Community. The importance of an MOU signed in 1987 (to which we referred last year) creating EUROMET, an organization intended to foster improved cooperation among the European standards laboratories, should not be underestimated. Developing measurement services and providing access to those services are among the aims of this EUROMET organization. When our less centralized approach to disseminating the national standards of measurement (and its reliance on a single national laboratory) is contrasted with the Europeans' more officially hierarchical structure (and emerging multi-national, multi-laboratory capability) in this regard, it is clear that competition in the calibration and standards arena will be heightened.

As we have noted in the past, there is an irrevocable like between product quality and measurement which has been largely overlooked in this country. The key to product verification and testing required by a modern, efficient and effective quality control program is sound and proper measurement, based on a program of standardization to assure the accuracy and consistency of those measurements. Measurement standardization is achieved most efficiently through an effective, well-understood and properly functioning national measurement system, headed by a competent and committed national standards laboratory. Quality and measurement and their bases in standards and calibration are beginning to be seen as vitally important just at a time when industry is becoming more quality conscious and increasingly measurement-reliant or, if not measurement-reliant, clearly should be.

The importance of standards, measurement and calibration as we approach 1992 and the formation of new European Economic Community (EC92) cannot be overemphasized. Within the new Community, trade barriers will be all but eliminated; non-tariff barriers to trade between the Community and the U.S. must be carefully guarded against. One such potential non-tariff barrier relates to standards and measurement. Although we still do not see any current indication that EC92 will foster such actions, we do see a significant cost advantage to members of the

Community in this regard compared to outsiders. Our need is to have sufficient standards and dissemination techniques to compete with - not to depend on - our new trading partner. Furthermore, this system must be able to be recognized by those outside of it, particularly the EEC.

The ability of the U.S. to compete in this area will include dependence on a healthy NIST and specifically its core missions of measurement standards development and dissemination. We believe that the Administration's proposal this year aims at doing just that.

Mr. Chairman and Members of the Committee, NCSL urges support of the entire FY 1992 budget proposed by the Administration and we would single out for specific mention the following major initiatives related to the dissemination of standards to industry through calibration services and standard reference materials.

1. Lightwave measurement technology (fiber optics);
2. Microwave measurement technology;
3. Advanced semiconductor measurement technology;
4. Magnetic measurement technology;
5. Chemical measurements and standards;
6. Manufacturing standards for the 21st century; and
7. Intelligent machines (fundamental measurement theory);

All of these areas are of vital importance to American industry and should be supported by the Congress. These areas affect what we will be able to do in the field of measurement, competing with other nations now and into the future.

Finally, Mr. Chairman and Members of the Committee, in closing we'd like to quote a passage from Dr. Lyon's paper which we think correctly states the challenges: 'The decade of the 1990s may be the most exciting and demanding for NIST since it was created as NBS in 1901. The redefinition and augmentation of the NIST mission by the Omnibus Trade and Competitiveness Act of 1988, the creation of new extramural and outreach programs, and the recognition of the importance of NIST's intramural research and services all place special obligations and responsibilities on this Institute and offer new opportunities. NIST's staff and management are ready and able to respond." NCSL urges this Committee to respond as well and to provide NIST with the means to meet those challenges.

THE SECRETARY OF COMMERCE
Washington, D.C. 20230

SEP 14 1990

September 11, 1990

Honorable Tim Valentine
Chairman
Subcommittee on Science, Research and Technology
Committee on Science, Space and Technology
House of Representatives
Washington, D.C. 20515

Dear Mr. Chairman:

I am pleased to submit this Status Report of the Clearinghouse for State and Local Initiatives on Productivity, Technology and Innovation. This report was promised in the First Annual Report of the Clearinghouse, which was submitted in January 1989. Our next report will be sent prior to January 1 1992, as statutorily required under Section 5122(d) of the Omnibus Trade and Competitiveness Act of 1988.

This report covers the activities of the Clearinghouse from its inception through the end of June 1990. It concentrates on the cooperative work done by the Department of Commerce with the Advisory Commission on Intergovernmental Relations. That work helped to generate the program ideas which will be incorporated into the operating plan of the Clearinghouse. The report then briefly reviews program accomplishments to date and what the Technology Administration anticipates doing in the next year.

Sincerely,

Robert A. Mosbacher

Enclosure

STATUS REPORT TO CONGRESS
ON THE
CLEARINGHOUSE FOR STATE AND LOCAL INITIATIVES
ON PRODUCTIVITY, TECHNOLOGY, AND INNOVATION

(SECTION 5122 OF P.L. 100-418)

BY

TECHNOLOGY ADMINISTRATION
U.S. DEPARTMENT OF COMMERCE

WASHINGTON, D.C. 20230

June 1990

PREFACE

The Omnibus Trade and Competitiveness Act of 1988 (P.L. 100-418) established the Clearinghouse for State and Local Initiatives on Productivity, Technology, and Innovation -- the Clearinghouse -- in the Department of Commerce (DOC), Technology Administration. By including the Clearinghouse in the Trade Act, Congress explicitly recognized that state and local governments are in the forefront of fostering productivity, technology, and innovation, and that federal policy needs to be coordinated with these efforts.

America's trade position and technological supremacy are now being challenged. Our competitors are aggressively pursuing their own interests as the world has become "a global marketplace." To promote the economic security of the U.S. through helping U.S. businesses become more competitive, the Technology Administration has the goal of expanding industrial research and development and accelerating the commercial application of new technologies.

The Clearinghouse for State and Local Initiatives on Productivity, Technology, and Innovation (the Clearinghouse) is one of several Technology Administration programs that will be instrumental in speeding up the commercialization of new technologies by new and existing businesses of whatever size. To meet the global competitive challenge, small and medium-sized businesses in particular must use strategic partnering (joint ventures with other firms, and with universities, community colleges, federal, state and local government, as well as formal -- vertical and horizontal -- cooperatives) to leverage the resources needed so that they can compete with the best products and services possible at the lowest cost and in time. The proposed role of the Clearinghouse is to focus its efforts on those who assist businesses, by organizing these resources into an effective network, and by providing an analytical perspective on what works, and under what conditions.

The First Report was required before January 1, 1989 only a few months after the Trade Act was passed. Hence, this Status Report to Congress was volunteered by the Technology Administration in order to document activities through June 1990.

The Clearinghouse report is a joint effort of many Technology Administration staff. Mr. Mark Lieberman, Deputy Assistant Secretary for Technology Policy, with the assistance of Mr. David Edgerly of the National Institute of Standards and Technology (NIST) established the framework for the effort. Subsequently, Messrs. Thornton Parker and Richard A. Johnson and Mrs. Elizabeth Robertson of the Office of Technology Commercialization, and Dr. Robert Chapman of NIST were instrumental in the design and implementation of the activities described in the report.

ABSTRACT

The purpose of this report is two-fold. First, it documents the activities of the Clearinghouse from its inception through June 1990. Many of these early activities center on the cooperation between the Department of Commerce (DOC) and the Advisory Commission on Intergovernmental Relations (ACIR). Second, and most importantly, this report describes the planned activities for the Clearinghouse during fiscal year 1990. It is important to note that the fiscal year 1990 plan for the Clearinghouse's activities benefited significantly from the ACIR's Final Report to DOC.

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1. INTRODUCTION

1.1 BACKGROUND

The Omnibus Trade and Competitiveness Act of 1988 (P.L. 100-418) established the Clearinghouse for State and Local Initiatives on Productivity, Technology, and Innovation -- the Clearinghouse -- in the Department of Commerce (DOC), Technology Administration. By including the Clearinghouse in the Trade Act, Congress explicitly recognized that state and local governments are in the forefront of fostering productivity, technology, and innovation, and that federal policy needs to be coordinated with these efforts.

The legislative authority for the Clearinghouse is contained in Section 6(a) of the Stevenson-Wydler Technology Innovation Act of 1980 (15 U.S.C. 3701 et seq.), as amended by section 5122 of the Trade Act. As stated in section 5122 of the Trade Act:

"The Clearinghouse shall serve as a central repository of information on initiatives by state and local governments to enhance the competitiveness of American business through stimulation of productivity, technology, and innovation and federal efforts to assist state and local governments to enhance competitiveness."

The legislation enables the Clearinghouse to establish relationships with all levels of government; provide technical assistance; collect and disseminate information on the nature, extent, and effects of initiatives; disseminate information through conferences, handbooks and seminars; enter into contracts for the collection of information; and develop evaluation methodologies. The Clearinghouse, however, is prohibited from evaluating individual state and local programs unless specifically requested to do so by the state or locality. Because of the emphasis on the relationship between federal, state, and local initiatives, DOC enlisted the assistance of the U.S. Advisory Commission on Intergovernmental Relations (ACIR) in designing an appropriate scope and role for the Clearinghouse and in developing a plan for implementing the design.

The Clearinghouse function and authority under section 5122 of the Trade Act is separate and distinct from the state technology extension responsibilities assigned to the Secretary under sections 5121 (a) and (b) of the Act. These latter functions are principally concerned with providing state extension agents information about and access to scientific and engineering advice and assistance from federal laboratories.[1]

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[1] The objective of the Technology Administration's State Technology Extension Program is to equip the state extension agent with the ability to access federally-developed technology (and federal technical experts) and, when appropriate, to service small and medium-sized businesses at the local level. A secondary objective is to realize a coordinated national network of federal and state technology assistance programs.

1.2 PURPOSE

The purpose of this report is two-fold. First, it documents the activities of the Clearinghouse from its inception through the beginning of the calendar year 1990. Much of these early activities center on the cooperation between DOC and the Advisory Commission on Intergovernmental Relations (ACIR). Second, and most importantly, it outlines an operating plan for fiscal year 1990. It is important to note that the operating plan for the Clearinghouse benefited significantly from ACIR's Final Report to DOC.[1] (Also see Appendix, page 5 et seq.)

Based on ACIR's Final Report, the Technology Administration developed a draft operating plan for the Clearinghouse for fiscal year 1990. The operating plan, as described in this report, recommends that the Clearinghouse undertake three roles: (1) to serve as a Repository of "who is doing what" in the area of federal, state and local initiatives to enhance competitiveness; (2) to serve as a Network, fostering the sharing of resources and experience among those who provide information and assistance to help businesses become more competitive; and (3) to serve as an Analytical Institution concerned with the variety and effectiveness of these initiatives.

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[1] Scope and Design of the Clearinghouse for State and Local Initiatives on Productivity, Technology, and Innovation, Washington, DC: U.S. Advisory Commission on Intergovernmental Relations, September 1989.

2. REVIEW OF MAJOR ACCOMPLISHMENTS

2.1 COOPERATION WITH THE ADVISORY COMMISSION ON INTERGOVERNMENTAL RELATIONS (ACIR)

In September 1988, Department of Commerce signed an interagency agreement with ACIR to prepare a report detailing the proposed scope and design for the Clearinghouse. To undertake these activities, ACIR with the guidance and cooperation of the Technology Administration, embarked on a two-phased approach. In the first phase, ACIR convened a series of "Thinkers' Sessions." The objective of the "Thinkers' Sessions" was to provide a forum for open discussion and consultation on the design of the Clearinghouse. In the second phase, ACIR commissioned a series of research papers to focus on key issues concerning the design of the Clearinghouse. ACIR's Final Report included detailed descriptions of the above-mentioned activities as well as a set of conclusions and recommendations. Simultaneously the Technology Administration developed the initial Clearinghouse database and drafted an operating plan for the Clearinghouse (see Table 1). A brief summary of the Final Report is given in the text which follows.

ACIR Thinkers' Sessions

Through the thinkers' sessions, ACIR and the Technology Administration were able to tap the expertise of a wide spectrum of potential users of and contributors to the Clearinghouse. A series of five thinkers' sessions drew on some of the Nation's foremost experts in technology and innovation and on leaders and representatives of organizations in the forefront of federal, state, and local policymaking in the economic development arena. The first meeting gathered private sector representatives, including owners of small businesses assisted by state and local programs, private technology brokers, and representatives of trade associations. Attendees of the second meeting were state and local assistance providers and policy makers who work directly with businesses in providing technical, financial, or managerial assistance. The third meeting consisted of representatives of organizations with a national public policy perspective. The fourth meeting brought together staff from various federal agencies involved in technology transfer. The fifth meeting served to summarize the findings from the first four thinkers' sessions and to seek guidance from representatives of each of the previous meetings.

The consensus in the meetings was that the primary users of the Clearinghouse should be the individuals and organizations that create, operate, and participate in state and local initiatives that foster technology, productivity and innovation. Most participants felt that the public sector, or public purpose agencies, were the most appropriate point of initial focus. This initial emphasis is not intended to exclude the participation of trade associations or other private sector entities that can provide information, insights and advice. The contributions of these organizations are eagerly sought since they share the same concern and aspirations for the improved competitiveness of American industry. By focusing initially on state and local entities, however, the Clearinghouse will be able to work with a user base with a somewhat narrowed set of priorities which is more consistent with its limited resources.

Table 1. Summary of Major Accomplishments

DATE	MAJOR ACCOMPLISHMENTS
September 1988	DOC negotiated an interagency agreement ($250,000) with the Advisory Commission on Intergovernmental Relations (ACIR) to work with it in developing the Clearinghouse.
December 1988	Secretary's Report to Congress on Clearinghouse efforts.
March 1989	ACIR Thinker Session #1: Private Sector Activities.
	ACIR Thinker Session #2: State and Local Program Administrators.
April 1989	ACIR Thinker Session #3: Public Interest Groups.
	ACIR Thinker Session #4: Federal Agency Representatives.
June 1989	ACIR Thinker Session #5: Summary Meeting with Invitees from Previous Sessions.
July 1989	Critics session to review ACIR research papers.
September 1989	ACIR Final Report delivered to DOC.
	First stage DOC database completed (includes state and local contacts, NIST/NGA survey results, NTIS federal and state assistance catalogue).
October 1989	Technology Administration develops a draft operating plan for the Clearinghouse.
February 1990	Technology Administration staff meets with selected representatives from public interests groups and state government agencies to review draft operating plan.
March 1990 to June 1990	Technology Administration staff made presentations at selected conferences around the nation to announce the Clearinghouse.
June 1990	Technology Administration staff develops comprehensive electronic data base of state and local initiatives for productivity and technology.
	Information brochure describing the Clearinghouse and its services developed.

ACIR Research Papers

On July 25, 1989, ACIR held a critical review session for the research papers. Several service providers and policy people who had also attended the thinkers' sessions participated. The authors of the papers incorporated many of the participants' suggestions into the papers summarized below. (Also see Appendix, pages 19-116.)

"State Policies and Programs for Encouraging Innovation and Technology Development," Marta V. Goldsmith. This paper reviews state policies and programs in technology development and reports on the work of multi-state organizations in this area. The emphasis of the paper is on technology development programs, specifically, those research, commercialization, education, technology transfer, and business assistance activities undertaken by a state to promote economic growth.

"Federal Technology Transfer: Critical Perspectives," Louis Mogavero, Kenneth Susskind and Achmad Chadran. This paper outlines critical perspectives of key entities involved in the transfer of federally-funded technology to the private sector. The objective of the paper is to provide insight into the technology transfer process through lessons learned by these entities and gained through actual hands-on experience in this field, be it from the perspective of a business, broker, or technologist.

"Sources of Technical and Managerial Information and Services Used by Technology-Based Small Business Firms: Implications for Federal Research and Program Initiatives," Edward Kelly. The purpose of this paper is to increase understanding of the sources of technical and managerial information and services used by small technology-based firms. Both providers and users of such information and services were surveyed. However, because of the limitations in data collection, this effort should be seen as an attempt to refine the hypotheses regarding this subject, rather than providing definitive results.

"Review and Comparison of Clearinghouse-Type Initiatives," Sally Rood and Edward Kelly. This paper analyzes 16 representative clearinghouses. The purpose of the paper is to assist in the design and operation of the DOC Clearinghouse. Recommendations are given regarding the roles of the federal government in stimulating innovative activities by state and local governments, as well as the organizations to which they turn for information and assistance.

Summary of Major Conclusions and Recommendations

The following is a summary of the major conclusions and recommendations synthesized as a result of the ACIR/DOC convened Thinkers' Sessions, issue papers prepared under contract, the ACIR Final report as well as a strategy paper prepared by the Technology Administration staff.

- Despite the presumption that little is known about initiatives to enhance competitiveness, a great deal of information on federal, state, and, to a lesser extent, local initiatives already is available.

- Such existing information is formatted and presented in many different ways for different purposes and different audiences. There are both duplication of effort in some topical areas and gaps where information is either unavailable or out-of-date. Further, many people do not know about the availability of existing resources. Finally, much of this information is dated and no longer fully accurate.

- The primary constituents of the Clearinghouse should be federal, state, and local government agencies, and the U.S. Congress, with other intermediaries phased in as resources permit.[3]

- The Clearinghouse should undertake three roles: (1) to serve as a Repository of "who is doing what" in the area of federal, state and local initiatives to enhance competitiveness; (2) to serve as a Network, fostering the sharing of resources and experience among those who provide information and assistance to help businesses become more competitive; and (3) to serve as an Analytical Institution concerned with the variety and effectiveness of these initiatives.

2.2 SURVEY OF DIRECTORIES ON FEDERAL, STATE AND LOCAL INITIATIVES

Clearinghouse and ACIR staff collected 19 directories of sources of assistance to businesses. The kinds of assistance included in the directories ranged from preparation of business plans through location of specialized technological and resource information. Information on manufacturing modernization efforts, as well as help in locating seed and venture capital, is also included. General types of assistance were tabulated under 13 different headings (see Appendix, pages 118-128 for details).

Subsequent Clearinghouse staff analysis showed that of the 19 guides or directories, many arrayed common kinds of information, although the coverage was different. Thus, in comparing two directories that arrayed information on technology transfer programs, overlap was present, but not to a great degree. This implied that each sponsoring organization was paying particular attention to the needs of its special constituency, focusing on those programs that were particularly relevant. The overlap did imply, however, that sponsoring organizations might rationalize their activities through a coordinated effort to gain a wider scope of data and more current data, while lowering costs to the individual sponsor.

2.3 NETWORKING ACTIVITIES WITH STATE AND LOCAL GOVERNMENTS

Networking activities formally occurred in the context of five separate meetings which ACIR and the Clearinghouse sponsored. Over 120 representatives of public and private service providers participated in the sessions. Many follow-up conversations have been held with these participants and other federal, state and local officials. Out of this activity has emerged a consensus on the best way to implement the Congressional intent for the Clearinghouse: (a) maintain a repository of initiatives derived from the best possible source; (b) strengthen the network among individuals working in this area; and (c) work to determine "lessons learned" about "what works where, when, and how" that can benefit the state and local assistance provider community, the Executive Branch, and Congress.

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[3] The ACIR Final Report points out that an early and initial focus on governmental entities gives the Clearinghouse a clearly-defined user base with which to develop a rapport. Further, in addition to federal agencies, Congress is an especially important national audience for information on state and local initiatives and on the degree to which federal programs and resources affect such initiatives.

Subsequently, the Clearinghouse staff developed a computerized information system to respond to inquiries. This electronic data base includes over 2000 entries, including comprehensive and up-to-date information on state technology initiatives. Inquiries have ranged from state technology program managers wanting to find out how particular aspects of other state programs operate to businesses seeking information on state programs to assist them to researchers wanting to find out what has been written on particular subjects related to technology efforts. In addition, the Clearinghouse has provided information to a number of federal officials seeking to work more closely with state and local officials in the area of technology and productivity.

3. SUMMARY OF PLANNED ACTIVITIES FOR THE CLEARINGHOUSE DURING FISCAL YEAR 1990

Based upon the conclusions and recommendations from the ACIR Thinkers Sessions, ACIR's Final Report, and internal DOC discussions, the following activities are planned for the Clearinghouse during fiscal year 1990. The planned activities are broken down according to the specific roles of the Clearinghouse. The planned activities assume a minimum staffing level of three full-time equivalent professionals, and funding for overhead costs and "other objects" funding (e.g., conferences, workshops, handbooks, travel, studies).

3.1 THE REPOSITORY ROLE OF THE CLEARINGHOUSE

Specific Clearinghouse activities for fiscal year 1990 under this role are planned as follows:

A. Developing and maintaining a computerized information system listing federal, state and local productivity, technology and innovation initiatives, contacts, and written material in this area (reports, articles, evaluations, etc.). The information will be categorized by a number of factors to permit easy access in response to a wide variety of inquiries (e.g., What states have set up seed capital funds? What has been written about university-industry partnerships?).

Status: Work will be completed by July 15.

B. Working with other organizations to cooperatively publish a state-of-the-art 1990 report listing state technology programs in the U.S.

Status: Clearinghouse staff has begun to work with the Minnesota Office of Science and Technology and Virginia's Center for Innovative Technology to cooperatively produce a guide to state technology programs, using the information the Clearinghouse has compiled. This report is expected to be published in November 1990.

C. Ascertaining which organizations produce or collect information and making arrangements with them to coordinate activities.

Status: Work began in November 1989. Clearinghouse staff are approaching organizations for cooperation in resource sharing, to begin arrangements for new data collection where possible, and to coordinate activities with such organizations. This will be an on-going effort.

D. Producing bibliographic guides as a way to publicize the existence and usefulness of the existing business and technology transfer resources and to make them available to federal, state, and local program managers and policy makers. These include a Guide to National Clearinghouses on Federal, State, and Local Initiatives, a Guide to Directories Providing Information on Federal, State and Local Initiatives, and a Guide to Professional Program Developers and Administrators.

Status: The guides (see Appendix, pages 117-167) are completed and are now available from the Clearinghouse in the form of brochures.

E. Identifying areas where information is not available or is not recent, and then seeking ways to fill those gaps, either through Clearinghouse efforts or by funding studies.

Status: Efforts to analyze existing information directories for gaps are being carried out in conjunction with item C listed above.

With regard to items C and E, the Clearinghouse staff are working to rationalize the efforts of those federal agencies which have produced 9 of the 19 directories analyzed during fiscal year 1989. Several agencies have agreed to use the same field names and to cooperate in a single data collection effort, if that is possible, after further analysis of each agency's needs. This proposed multiple-agency data collection effort will mean less paperwork for assistance providers being surveyed. One early result of this effort is that one agency, which had not planned to update its directory, because of insufficient funds, has agreed to cooperate in this multi-agency effort.

3.2 THE NETWORKING ROLE OF THE CLEARINGHOUSE

Specific Clearinghouse activities for fiscal year 1990 under this role are planned as follows:

A. Publicizing the Clearinghouse. The Clearinghouse will develop and print a brochure describing its activities and the services it provides. This and a cover letter announcing the Clearinghouse will be sent to federal, state, and local officials.

Status: Work will be completed by August 31.

B. Participating in conferences and workshops held by other organizations in order to publicize Clearinghouse projects and products and to keep the Clearinghouse staff current on the projects and products of others.

Status: Since March 1990 the Clearinghouse staff has attended and made presentations at numerous scheduled conferences related to technology transfer and state and local technology efforts.

3.3 THE CLEARINGHOUSE AS AN ANALYTICAL INSTITUTION

Specific Clearinghouse activities for fiscal year 1990 under this role are planned as follows:

A. Developing an analytical framework for understanding the role that federal, state and local initiatives play in enhancing the competitiveness of American business. Little work has been done on common definitions or standardized categories of state and local initiatives on which to base analytical efforts. Also, there is no single source that provides generic descriptions of program models to assist those in the process of program design. Once developed, the framework should be used to set the agenda and priorities for data collection, workshop convening, more complex analytical tasks, and the marketing of Clearinghouse services as a whole.

Status: Between September and December 1990, the Clearinghouse will design an appropriate framework for future analytical activities, begin categorizing initiative types, and choose priority initiatives for further study.

B. Documenting the different forms federal, state and local initiatives take in enhancing the competitiveness of American business.

Status: As an on-going activity, the Clearinghouse will assemble material on program models for selected initiatives like seed capital programs, manufacturing modernization efforts, etc., in order to begin to develop or commission material to fill in the gaps in recency of information and breadth of knowledge.

C. Investigating the lessons learned about "what works" and "what works where." The Clearinghouse should examine existing assessments and evaluations done by the states themselves and by others, and produce or commission a state-of-the-art report giving an overview of the kinds of questions asked, the methodologies used to answer them, and the criteria commonly employed to assess success. The Clearinghouse's role is to act, not as a judge, rather as a collector of information about the impact and effectiveness of these initiatives.

Status: During FY 1991, the Clearinghouse will produce a state-of-the-art report giving an overview of existing assessments and evaluations done by the states themselves. The report will include the kinds of questions asked by the states in their assessments, the methodologies used to answer them, and the criteria commonly used to assess success.

3.4 TECHNICAL AND OPERATIONAL CONSIDERATIONS

In carrying out the tasks and activities described above, the Clearinghouse will be guided by the following considerations:

- The agenda of activities outlined in Roles 1 through 3 have not yet been prioritized.

- Emphasis will be given to assuring that the Clearinghouse properly organizes its resources before beginning to market its services.

- The element of human contact, as opposed to strictly computerized access, is essential for a useful and responsive Clearinghouse. The user of the Clearinghouse should be able to talk to a person who can help define the question and locate an answer or source for the answer.

- Discretion must be used to keep from overloading information providers with referrals.

- The Clearinghouse should strive for a sensible, easily identifiable product mix (e.g., produce tangible products and set up networking processes as part of its overall mission).

4. SUMMARY OF PROGRESS AND FUTURE ACTIONS

The Clearinghouse has made significant progress towards the establishment of a well-defined user and product base. The activities of the Clearinghouse up through the end of calendar year 1989 focused on a cooperative effort between the Technology Administration and the Advisory Commission on Intergovernmental Relations (ACIR). DOC efforts included close cooperation with ACIR on all aspects of Thinkers' Sessions, especially in providing initial guidance on the issues papers. Also, Technology Administration emphasized the development of data and information for use by state and local governments. ACIR's task was to develop the scope of operations and overall design for the Clearinghouse. NIST worked closely with both the Clearinghouse staff and ACIR to share information on its own related program -- established under section 5121 of the Trade Act -- to provide technical assistance to state extension services.

The interactions between DOC, ACIR, and other interested parties served to identify the user community and their information requirements. The primary constituents of the Clearinghouse should be federal, state, and local agencies, and the U.S. Congress, with other intermediaries phased in as resources permit. In serving these constituents, the Clearinghouse will undertake three roles: (1) to serve as a Repository of "who is doing what" in the area of federal, state and local initiatives to enhance competitiveness, (2) to serve as a Network, fostering the sharing of resources and experience among those who provide information and assistance to help businesses become more competitive, and (3) to serve as an Analytical Institution concerned with the variety and effectiveness of these initiatives.

Staff has begun to handle inquiries under its Repository role. Staff has begun to inform the (user) community that the Clearinghouse is operational. The user community to be notified will include: participants in the ACIR thinker sessions; state economic development and technical assistance programs and managers identified as part of the technology extension study conducted by NIST, in cooperation with the National Governors' Association (NGA); major public interest organizations; other federal agencies; and select Congressional Committees. Throughout 1990, DOC will work actively to develop the Clearinghouse's roles as a network and as an analytical institution.

APPENDIX (attached)

State and Local Initiatives on Productivity, Technology, and Innovations
Enhancing a National Resource for International Competitiveness

May 1990

Advisory Commission on Intergovernmental Relations

NIST
UNITED STATES DEPARTMENT OF COMMERCE
National Institute of Standards and Technology
Gaithersburg, Maryland 20899
OFFICE OF THE DIRECTOR

FEB 4 1991

Honorable George E. Brown, Jr.
Chairman, Committee on Science, Space
and Technology
House of Representatives
Washington, D.C. 20515

Dear Mr. Chairman:

We have received your Committee's letter, cosigned by Mr. Roe and Mr. Walker, concurring with our 1991 fee structures for Standard Reference Materials (SRM's) and Calibration Services. We share the Committee's concern about general trends in the use of Calibration Services and are continuing a close watch of the situation.

In response to the inquiry regarding how calibration developmental surcharge revenues are being spent, we have enclosed a list of funded projects for fiscal years 1988 through 1990. Your Committee also expressed an interest in how the priorities for spending the revenues from the developmental surcharge are determined. Potential developmental projects (these can be for new or improved services) are submitted by NIST technical units. These proposals are reviewed by the NIST Calibration Advisory Committee and prioritized based on industry's expressed needs, urgency, potential customer base, and technical feasibility.

The Measurement Services staff at NIST is currently considering what changes may be needed in the surcharge structure and rates for service development in the SRM and Calibration programs. We have contacted the GAO team and will continue to seek their input as to possible options for 1992. Our goal is to have the plan for 1992 prepared by this spring so that we can discuss options with you at an early date.

Sincerely,

John W. Lyons
Director

Enclosure

Identical Letter sent to Honorable Robert S. Walker

ACCOMPLISHMENTS FOR

CALIBRATION SERVICE DEVELOPMENT PROJECTS

OCTOBER, 1990

FY88 CALIBRATION SERVICE DEVELOPMENT PROJECTS

PRIORITY

1 521 ELECTRICITY DIVISION AND 722 ELECTROSYSTEMS DIVISION $125K
"Calibration Service for DVM, Data Converters, and other Ratio Devices"
To develop an automated Josephson array based sub-ppm precision calibration service over a -1 to +1 V range to measure the accuracy, resolution and linearity of new commercial instruments capable of 1 ppm accuracies.

ACCOMPLISHMENTS:
This multiyear project has developed and characterized a new 10-volt Josephson-array system with the capability to now offer special test services for 10 V zenner voltage reference standards, high-precision digital volt meters from -10 V to +10 V, and resistive dividers. The system has already been used to conduct high-accuracy comparisons between Josephson-arrays at NIST and those in industrial laboratories; to test new prototype devices from instrument manufacturers to help improve their design; and to calibrate high-precision DVM's used in other NIST services such as the force calibration service for load cells.

2 536 IONIZING RADIATION DIVISION $75K
"Dosimetry Calibration Service"
To establish a calibration facility for electron and photon beams with energies in the 5 to 35 MeV range characteristic of most accelerators used in cancer radiation therapy which are presently calibrated at 1 MeV. The request is for partial startup funds for a multiyear project.

ACCOMPLISHMENTS:
During the first year of this project, two equipment assemblies essential to the project were designed and fabricated; an electron target and beam collimator assembly to produce the required electron and photon beams, and a phantom and dosimeter transport table to position the water phantom, calorimeter, and ionization chambers in the electron and photon beams. Preliminary measurements were made on the design characteristics of the calorimeter.

3 731 PRECISION ENGINEERING DIVISION $50K
"Grid Plate Measurements"
To develop a system that will reduce the grid plate measurement uncertainty by an order of magnitude, from 0.25 to 0.025 micrometers.

ACCOMPLISHMENTS:
This is a multiyear project which is now scheduled to reach the targeted uncertainty of 0.025 micrometers in 1992. There are three major components of the system: an automated microscope, laser system and stage. To date, the automated microscope has been

FY88 CALIBRATION SERVICE DEVELOPMENT PROJECTS

PRIORITY

developed with a machine vision system and automated readout. The laser system has been ordered. The stage is under construction at a commercial company and should be delivered in December 1990.

4 534 RADIOMETRIC PHYSICS DIVISION $50K
"Luminescence Calibrations"
To extend the calibration capabilities for corrected emission spectra of luminescence materials to the 250 to 350 nm range.

ACCOMPLISHMENTS:
The reference spectrofluorimeter was refurbished to extend the calibration ranges into the near ultraviolet region. This included a new holographic grating, new coated optics, and instrument alignment. New calibration sources were obtained and calibrated on the NIST FASCAL system. A new silicon diode/amplifier package was fabricated and its spectral response measured from 200-1050 nm. The refurbished instrument is currently being used to develop ultraviolet fluorescence standards.

5 722 ELECTROSYSTEMS DIVISION $75K
"Electric Power and Energy Calibrations"
To develop ac power/energy calibration service that will include: power frequency measurements to 100 ppm routinely and 20 to 50 ppm on special test for 120 to 600 V and 1 to 50 A; audio frequency to 20 kHz measurements to 200 to 500 ppm; and measurements with highly distorted waveforms.

ACCOMPLISHMENTS:
Dual-channel digital synthesis calibration systems were developed that provide the targeted new capability for power and energy calibration services. As a result, the calibration uncertainty was reduced five-fold, the calibrations can be performed much faster, and NIST can routinely provide services for three additional quantities useful to the $166 billion power industry for reducing energy losses. NIST can now also provide calibration support for arbitrary waveforms of voltage and current.

6 521 ELECTRICITY DIVISION $57K
"AC-DC CALIBRATION SERVICE"
To develop new multijunction thermal converter standards to reduce the uncertainty by a factor of 3 at audio frequency and low voltage.

ACCOMPLISHMENTS:
Selected new multijunction thermal converters have been characterized. These new converters contribute to improved AC-DC difference calibrations including new special test calibrations which are now offered at audio frequency and low voltage with uncertainties reduced by a factor of three.

FY88 CALIBRATION SERVICE DEVELOPMENT PROJECTS

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7 731 PRECISION ENGINEERING DIVISION $45K

"Step-height and Roughness Calibration Services"
To develop a set of precise step-height standards for absolute measurement of film thickness with profiling instruments capable of calibrating 300Å steps with an uncertainty of ±10Å.

ACCOMPLISHMENTS:
Five new step-height standards have been developed and are now integrated into the step-height calibration facility with the targeted range and uncertainty. These measurements are critically needed for metrology in the optics and semiconductor industries.

8 723 ELECTROMAGNETIC FIELDS DIVISION $75K

"Thermal Voltage Converter Calibration System Automation"
To automate and upgrade the Boulder thermal converter calibration system to reduce the uncertainty by an order of magnitude and increase the speed and ease of measurement. The present system is cumbersome and near collapse.

ACCOMPLISHMENTS:
The thermal voltage converter calibration system was automated to increase speed, precision, and accuracy of measurements. A menu driven interface was developed to allow the operator to control the measurement procedure. Hardware improvements included a high precision dc voltage source, signal generator, digital volt meters, and a controller. Software was developed to set the voltages, store results, generate reports, calibrate bolometer mounts, and evaluate system performance. Thermal voltage converter calibration services are required to support the electronics instrumentation industry, aerospace and defense industries, the power utilities, and the medical electronics industry.

TOTAL $552K

FY89 CALIBRATION SERVICE DEVELOPMENT PROJECTS

PRIORITY

1 536 IONIZING RADIATION DIVISION $75K

"Dosimetry Calibration Service"

To establish a calibration facility for electron and photon beams with energies in the 5 to 35 MeV range characteristic of most accelerators used in cancer radiation therapy which are presently calibrated at 1 MeV. The request is for partial startup funds for a multiyear project.

ACCOMPLISHMENTS:

The second year accomplishments of the project are: the design and construction of a new water calorimeter; design of a water phantom for use with the water calorimeter; and, design and preparation of the new cobalt-60 teletherapy facility.

2 728 ELECTRICITY DIVISION $80K

"Calibration Service for DVM, Data Converters, and other Ratio Devices"

To develop an automated Josephson array based sub-ppm precision calibration service over a -10 to +10 V range to measure the accuracy, resolution and linearity of new commercial instruments capable of a few parts per million accuracies.

ACCOMPLISHMENTS:

This multiyear project has developed and characterized a new 10-volt Josephson-array system with the capability to now offer special test services for 10 V zenner voltage reference standards, high-precision digital volt meters from -10 V to +10 V, and resistive dividers. The system has already been used to conduct high-accuracy comparisons between Josephson-arrays at NIST and those in industrial laboratories; to test new prototype devices from instrument manufacturers to help improve their design; and to calibrate high-precision DVM's used in other NIST services such as the force calibration service for load cells.

3 723 ELECTROMAGNETIC FIELDS DIVISION $60K

"New Coaxial Microcalorimeter Primary Reference Standard for Power"

To design and build a new Primary Reference Coaxial Microcalorimeter for use as the national power standard for the 1-18 GHz frequency range.

ACCOMPLISHMENTS:

This is a two year project. In the first year, the design and construction of two new calorimeter baseplates and input transmission line assemblies were completed. Evaluation of the effect of the rf input port in the baseplates was completed. This study showed that the new design has eliminated the problem that existed in the original microcalorimeter so the new calorimeters can be used up to 18 GHz. A full error evaluation of the systems will be conducted in the second year.

FY89 CALIBRATION SERVICE DEVELOPMENT PROJECTS

PRIORITY

4 728 ELECTRICITY DIVISION $100K

"Electric Power and Energy Calibrations"

To develop ac power/energy calibration service that will include: power frequency measurements to 100 ppm routinely and 20 to 50 ppm on special test for 120 to 600 V and 1 to 50 A; audio frequency to 20 kHz measurements to 200 to 500 ppm; and measurements with highly distorted waveforms.

ACCOMPLISHMENTS:

Dual-channel digital synthesis calibration systems were developed that provide the targeted new capability for power and energy calibration services. As a result, the calibration uncertainty was reduced five-fold, the calibrations can be performed much faster, and NIST can routinely provide services for three additional quantities useful to the $166 billion power industry for reducing energy losses. NIST can now also provide calibration support for arbitrary waveforms of voltage and current.

5 731 PRECISION ENGINEERING DIVISION $50K

"Grid Plate Measurements"

To develop a system that will reduce the grid plate measurement uncertainty by an order of magnitude, from 0.25 to 0.025 micrometers.

ACCOMPLISHMENTS:

This is a multiyear project which is now scheduled to reach the targeted uncertainty of 0.025 micrometers in 1992. There are three major components of the system: an automated microscope, laser system and stage. To date, the automated microscope has been developed with a machine vision system and automated readout. The laser system has been ordered. The stage is under construction at a commercial company and should be delivered in December 1990.

6 728 ELECTRICITY DIVISION $45K

"New DC MAP Voltage Transport Standards"

To replace the existing DC Voltage MAP standard cells with improved Zener-based standards to reduce the transfer uncertainty and turnaround time and increase the probability of a successful transfer.

ACCOMPLISHMENTS:

A prototype solid-state standard has been constructed and is currently under evaluation. Also commercially available standards from three major instrument manufacturers were investigated for suitability as a MAP transport standard. The results of the investigation were fed back to the manufacturers and in some cases led to improvements in their products. High accuracy transfers were carried out with one of the improved instruments which produced accuracies at the 10 volt level three times better than that of standard cells. However, the standard cells still perform better at the 1 volt level.

FY89 CALIBRATION SERVICE DEVELOPMENT PROJECTS

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7 522 TEMPERATURE AND PRESSURE DIVISION $65K

"New Transition Range Pressure Standard"
To develop a new pressure standard covering the range from 10^{-4} to 100 Pa close an existing gap between our High Vacuum standard and the Ultrasonic Interferometer Manometer.

ACCOMPLISHMENTS:
This is a two year project. In the first year design alternatives were evaluated and the final design completed. Commercially available materials and components were purchased and the construction drawings were submitted to the shops. However construction and assembly were delayed due to a long que in the shops.

8 728 ELECTRICITY DIVISION $59K

"AC-DC Difference Calibration Service"
To establish new high performance working standards for AC-DC difference using amplifier-aided thermal converters and multijunction thermal converters.

ACCOMPLISHMENTS:
Commercially available broad-band buffer amplifiers and NIST constructed amplifiers have been studied with some success. The effectiveness of using such amplifiers with both voltage and current converters has been proven. Work continues on the design and study of buffer amplifiers and their use with new working standards.

9 723 ELECTROMAGNETIC FIELDS DIVISION $60K

"Circularly Polarized Antenna Check Standards"
To develop circularly-polarized horns to be used as check standards on the extrapolation range, as probes on the planar, cylindrical and spherical ranges, and as sources on the probe pattern range. This effort will enable NIST to provide a new calibration service for circularly-polarized antennas and will reduce the uncertainties in cross-polarized gains by up to 15 dB.

ACCOMPLISHMENTS:
Various ways of producing a circularly polarized mode in a waveguide over a wide bandwidth were first studied and then circularly polarized antennas were designed to maximize electrical and mechanical stability, useful bandwidth, and the use of off-the-shelf parts. Two sets of antennas were purchased to NIST specifications for the WR-22 and the WR-42 bands which have been shown to perform very well over the specified bandwidths. These new standards are critically needed to calibrate commercial communication systems.

FY89 CALIBRATION SERVICE DEVELOPMENT PROJECTS

PRIORITY

10 723 ELECTROMAGNETIC FIELDS DIVISION $75K
"Calibration Service for Fast Electrical Pulse Waveform Parameters"
To establish a NIST Calibration Service for a variety of fast electrical pulse generators in the time range of 10 picoseconds to 1 microsecond by completing the development of the Automatic Waveform Analysis and Measurement System which will serve as the NIST working standard.

ACCOMPLISHMENTS:
The Automatic Waveform Analysis and Measurement System (AWAMS) was completed. AWAMS provided improvements in the measurement processes and reduced the uncertainties in the measurement of various parameters of fast electrical pulses. These improved services are needed by the switching devices manufacturers and the computer and telecommunications industries because of the rapidly increasing switching speed of semiconductor devices used in digital applications.

11 732 AUTOMATED PRODUCTION TECHNOLOGY DIVISION $75K
"Ultrasonic Hydrophone Calibration"
To develop a measurement service for characterizing miniature underwater receivers which are used to measure the transient waveforms produced by ultrasonic transducers.

ACCOMPLISHMENTS:
This is the first year of an anticipated three-year project. The first-year accomplishments include: modified the ultrasonic radiation force balance to allow measurement of discontinuous power and conducted proof tests of measurements of continuous and discontinuous power; constructed downsized transducers for reduced transition distances; and, assembled test tank, scanning mechanism, and data acquisition system. This capability greatly expands the utility of the system in serving the needs of the medical ultrasonic community, since virtually all diagnostic equipment uses pulsed radiofrequency energy.

14 732 AUTOMATED PRODUCTION TECHNOLOGY DIVISION $40K
"Force Calibrations"
To repair and recalibrate the deadweight machine.

ACCOMPLISHMENTS:
The force balance was repaired, recalibrated, and put back on-line without serious disruption in the calibration service to the public.

15 512 INDUSTRIAL ROUND ROBIN $15K

ACCOMPLISHMENTS:
These funds were used to support NIST calibrations and data

analyses for industrial round robins in the dimensional, uv radiometry, and optical fiber measurement areas.

TOTAL $799K

FY90 CALIBRATION SERVICE DEVELOPMENT PROJECTS

PRIORITY

1 732 AUTOMATED PRODUCTION TECHNOLOGY DIVISION $75K
"Ultrasonic Hydrophone Calibration Service"
To develop a measurement service for characterizing miniature underwater receivers used to measure the transient waveforms produced by ultrasonic transducers.

ACCOMPLISHMENTS:
The second-year accomplishments of this three-year project involved setting up the facilities for field mapping including a waveform digitizer and a three-axis mechanical scanning system interfaced to a personal computer and the development of customized software to operate the system.

2 586 TEMPERATURE AND PRESSURE DIVISION $55K
"Primary Pressure Standard"
To develop a primary standard and calibration system in the 10^{-4} to 100 Pa range to close the gap in the vacuum standards that exists between 10^{-2} and 1 Pa.

ACCOMPLISHMENTS:
The new standard has been constructed and assembled consisting of two orifices and an array of laser-drilled holes. The orifices have been calibrated with nitrogen and the low pressure results agree well with the existing high vacuum standard. Characterization experiments of the laser-drilled array are underway.

3 723 ELECTROMAGNETIC FIELDS DIVISION $75K
"Evaluate New Coaxial Microcalorimeter"
To complete the new Primary Reference Coaxial Microcalorimeter for use as the national power standard with Type N and APC-7 connectors for the 1-18 GHz range by performing a comprehensive error evaluation.

ACCOMPLISHMENTS:
A full thermal analysis on the two microcalorimeter-transfer standards has been completed. Evaluation of all other error components including the effects of thermopile non-linearity, external instrumentation, thermistor lead resistance, and microwave leakage is still underway. When the latter evaluation is completed, these standards will provide improved calibration services needed to support the growth in microwave technology and applications in domestic electronics, communications, and defense.

4 723 ELECTROMAGNETIC FIELDS DIVISION $90K
"Antenna Facility for Near-Field Probes"
To design and install a new antenna facility for calibrating near

FY90 CALIBRATION SERVICE DEVELOPMENT PROJECTS

PRIORITY

field probes and performing spherical and cylindrical near-field antenna measurements. Measurements from the new facility will include absolute gain, antenna pattern, polarization and near-field probe coefficients.

ACCOMPLISHMENTS:
The design and installation of the new antenna facility have been completed. The final Y-axis alignment should be completed in early FY91. This new facility will provide traceability to national standards for over 30 near-field facilities in the U. S. for calibrating phased arrays and communication satellite antennas using the new technology of spherical near-field measurement techniques.

5 586 TEMPERATURE AND PRESSURE DIVISION $85K
"Platinum Resistance Thermometer Comparator"
To construct a comparator system for high temperature platinum resistance thermometers in the range from 600 to 975 degrees Celsius for automatic comparison calibration on the new International Temperature Scale ITS-90.

ACCOMPLISHMENTS:
The platinum resistance thermometer comparator system has been designed and the components constructed in the shops. Most of the assembly work has been completed. The remaining assembly and evaluation should be completed by mid-FY91. The comparator will then serve as the ITS-90 primary standard for high temperature resistance thermometers and thermocouples which are widely used in industry.

6 536 IONIZING RADIATION DIVISION $75K
"Dosimetry Calibration Service"
To establish a calibration facility for electron and photon beams with energies in the 5 to 35 MeV range characteristic of most accelerators used in cancer radiation therapy which are presently calibrated at 1 MeV. The request is for partial startup funds for a multiyear project.

ACCOMPLISHMENTS:
The third-year milestones for this project were met including: test of the water calorimeter, construction of the water phantom, replacement and test of the cobalt source, and the intercomparison of the calorimeter with the graphite ionization chambers. This project is expected to be complete in two years. There is a strong need for this facility as shown by the continuing demand for calibrations of instrumentation and dose measurements for medical therapy.

FY90 CALIBRATION SERVICE DEVELOPMENT PROJECTS

PRIORITY

7 576 TIME AND FREQUENCY DIVISION $85K
"Phase-Noise Calibration Service"
To develop a phase-noise calibration service for oscillators and signal processing equipment which operate between 1 and 50 GHz with band-widths from 0.1 Hz to 1 GHz. This calibration capability is required by the movement to very wide-band systems in both commercial and military communications and in high-resolution radar.

ACCOMPLISHMENTS:
The Time and Frequency Division has developed new measurement systems for measuring phase noise in oscillators, amplifiers, frequency synthesizers, and other electronic components. This service is of interest to military and civilian calibration laboratories and companies producing high-precision navigation and communications equipment. The system has an accuracy 2 to 4 times that of current commercial equipment and a frequency range 25 times greater. It can measure phase noise at carrier frequencies in the ranges 5 MHz - 26 GHz and 33 - 50 GHz. With external mixers, the measurement range can be extended beyond 100 GHz.

8 728 ELECTRICITY DIVISION $50K
"New Inductance Bridge"
To develop a new inductance bridge with digitally-synthesized sources and improved capabilities to replace the present Maxwell-Wein bridge which is 25 years old and beyond repair.

ACCOMPLISHMENTS:
In the first year of this project which is expected to be completed in two years, commercial sources were evaluated and found to be unacceptable. Experiments were conducted to verify the bridge design. A prototype digital source was developed and used to determine the expected bridge uncertainty. The software needed for automatic balancing of the bridge was developed and evaluation of the system was started.

9 728 ELECTRICITY DIVISION $60K
"DC Voltage and Resistance Ratio Service"
To develop a new calibration service for DC ratio voltage and resistive divider instruments using an automated Josephson array system.

ACCOMPLISHMENTS:
This multiyear project has developed and characterized a new 10-volt Josephson-array system with the capability to now offer special test services for 10 V zenner voltage reference standards, high-precision digital volt meters from -10 V to +10 V, and resistive dividers. The system has already been used to conduct high-accuracy comparisons between Josephson-arrays at NIST and those in industrial laboratories; to test new prototype devices

FY90 CALIBRATION SERVICE DEVELOPMENT PROJECTS

PRIORITY

from instrument manufacturers to help improve their design; and to calibrate high-precision DVM's used in other NIST services such as the force calibration service for load cells.

10 534 RADIOMETRIC PHYSICS DIVISION $85K
"Pyrometer Calibration Service"
To establish a calibration service for high accuracy pyrometers operating in the 0.8 - 1.2 micrometer spectral region.

ACCOMPLISHMENTS:
A monochromator based pyrometer with a spectral range of 500-1200 nm has been designed, and construction is about 95% complete. Plans for the characterization of the instrument have been developed and will include slit function, point spread function, and response function measurements.

11 585 CHEMICAL PROCESS METROLOGY DIVISION $120K
"Liquid Flowrate Measurements"
To develop absolute liquid density measurement capabilities to reduce the current uncertainty for liquid flowrate measurements.

ACCOMPLISHMENTS:
The liquid density measurement system design and instrument selection have been completed. An outside contractor fabricated and delivered the system. It has been assembled, put into operation, and is now being characterized with known standards. The system will be used to determine hydrocarbon liquid densities which will improve the accuracy of flow rate measurements required by the aircraft and aerospace industries.

12 752 FIRE SCIENCE AND ENGINEERING DIVISION $50K
534 RADIOMETRIC PHYSICS DIVISION $55K
"Heat Flux Sensor Calibration"
To develop the apparatus and techniques for calibrating heat flux gauges at levels up to 4 W/cm^2 and establish the technique as a new calibration service.

ACCOMPLISHMENTS:
The proposed apparatus and measurement techniques have been completed. The Center for Fire Research is now offering a new special test calibration service for total heat flux gauges used in fire experiments and standard fire tests. Current calibration fixtures accommodate Gardon or Schmidt-Boelter total heat flux gauges.

13 723 ELECTROMAGNETIC FIELDS DIVISION $60K
"Microwave Materials Calibration Service"
To initiate a new calibration service for dielectric properties of dielectric materials used in a wide variety of microwave systems, components and circuits.

FY90 CALIBRATION SERVICE DEVELOPMENT PROJECTS

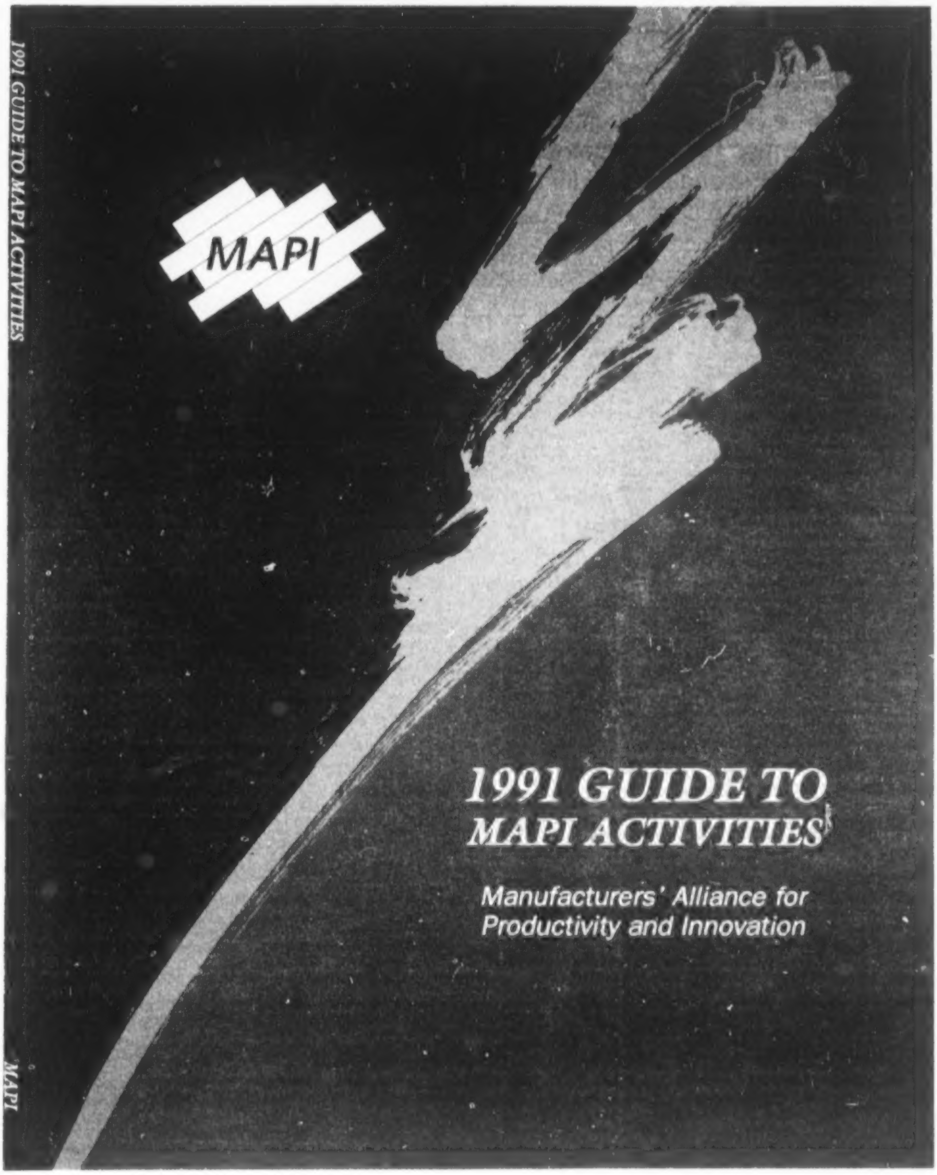
PRIORITY

ACCOMPLISHMENTS:
NIST has announced new special test services for dielectric material measurement. The initial work concentrated on the development of methods for measuring the permittivity, or dielectric constant, of low-loss materials. The new services are at present limited to solid, low-loss dielectric materials that are linear, homogeneous, isotropic, and non-magnetic. The most precise measurements achieve and accuracy of 0.5% for the dielectric constant.

14	512 INDUSTRIAL ROUND ROBINS	$20K

ACCOMPLISHMENTS:
This project supported the NIST calibration of standards and data analyses involved in industrial round robins in the dimensional, microwave, and uv radiometry areas.

TOTAL $1040K



1991 GUIDE TO MAPI ACTIVITIES

MAPI

MAPI

1991 GUIDE TO MAPI ACTIVITIES

Manufacturers' Alliance for Productivity and Innovation

MAPI is a policy research organization whose 500 member companies are drawn from the producers and users of capital goods and allied products. MAPI includes leading companies in heavy industry, automotive, chemicals, oil and gas, electronics, precision instruments, telecommunications, computers, office systems, aerospace, and similar high technology industries. MAPI conducts original research in economics, law, and management and provides professional analysis of issues critical to the economic performance of the private sector. MAPI acts as national spokesman for policies which stimulate technological advancement and economic growth for the benefit of U.S. industry and the public interest.

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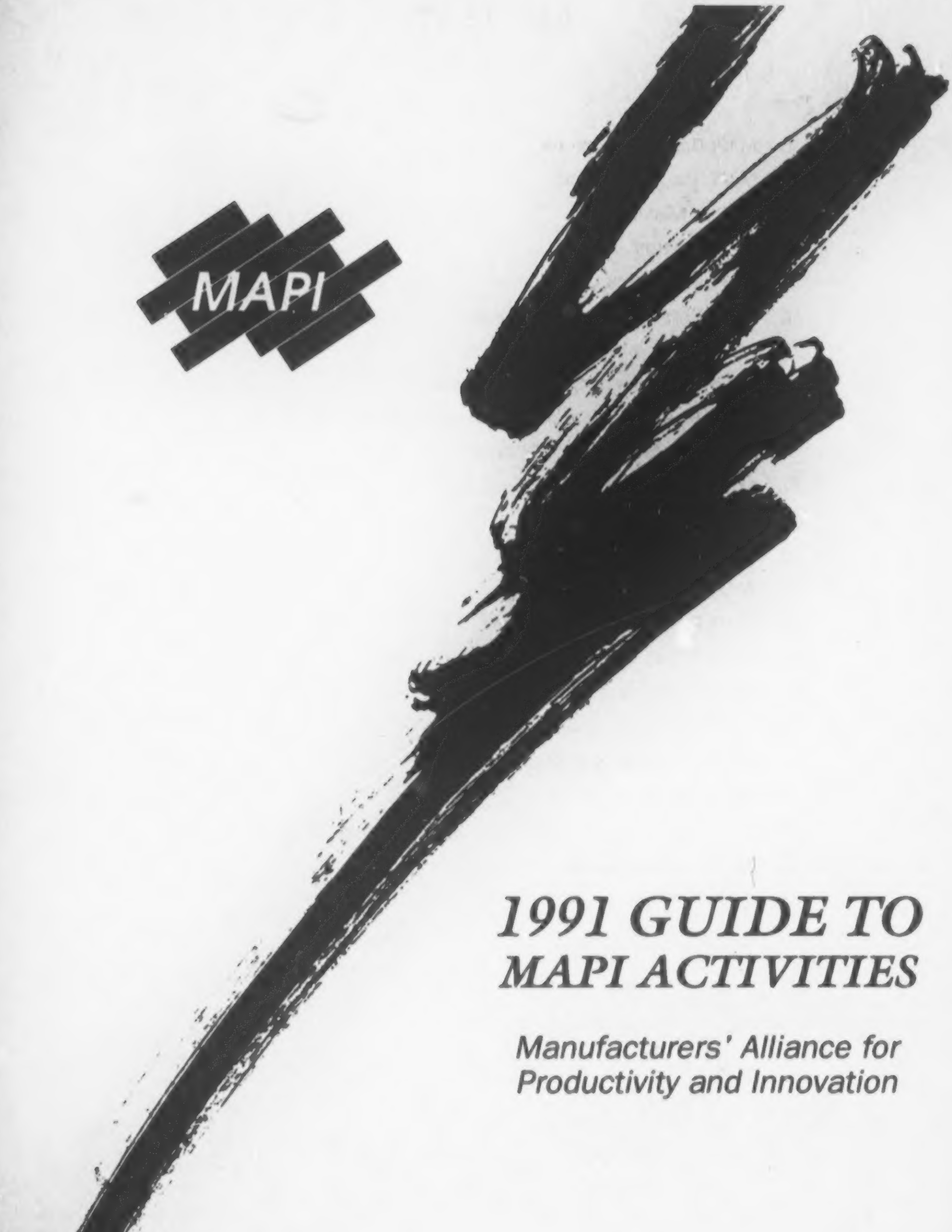

1991 GUIDE TO MAPI ACTIVITIES

Manufacturers' Alliance for
Productivity and Innovation

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Hilton Head, South Carolina
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Vice President and Secretary
Francis W. Holman, Jr.

Vice President and Chief Economist
Robert H. Aten

Vice President-Membership Relations
Fred E. Shand

Director-International Issues
Paul H. Pratt

Counsel
Frederick T. Stocker

MAPI Program Areas and Primary Staff Contacts

Economic Policy and Review of Economic Performance

Annual Conference on Business and Economic Policies
Robert Aten/Jerry Shipley/Richard Lykes/Patricia Buckley

Series on Review of Economic Indicators
Jerry Shipley/Patricia Buckley

Analysis of Economic Policy Issues
Robert Aten/Jerry Shipley/Patricia Buckley/Paul Pratt/Richard Lykes

Finance, Accounting, and Tax Issues

Regulatory Developments
Frank Holman/Tracy Hollingsworth Jones

Tax Legislation
Tracy Hollingsworth Jones/Frank Holman

Economic Implications of Tax Policy
Robert Aten/Patricia Buckley/Frank Holman/Tracy Hollingsworth Jones/Jerry Shipley

Business Operations

Manufacturing and Technology
Paul Pratt

Quality Assurance
Richard MacNabb/Dan Meckstroth

Purchasing
Jerry Shipley

Marketing
Jerry Shipley

Government Contracting Regulations
Elaine Guth/Frank Holman

Business and Public Policies

Capital Formation and Productivity
Robert Aten/Jerry Shipley/Frank Holman

Corporate Planning
Frank Holman/Patricia Buckley

International Trade Policies
Paul Pratt/Fred Stocker

Hazardous Materials Management
Richard Robinson/Fred Stocker/Diane Threlkeld

Products Liability
Larry Herman/Diane Threlkeld/Elaine Guth

Risk Management
Fred Stocker/Larry Herman

Human Resources Policies
Les Miller/Patricia Buckley

Government Contracting Policies
Elaine Guth/Frank Holman

Public Affairs and Legislative Developments
Fred Shand/Peggy Morrissette

Editor
Diane Threlkeld

Administration of MAPI Program

Membership Relations
Fred Shand/Marian Riegle

Press and Government Relations
Peggy Morrissette

MAPI Publications Management
Diane Threlkeld

Legislative and Regulatory Documents
Richard Lykes

Office Administrator and Conference Planning
Steven Kerchner

Accounting Manager
Barbara Forsyth

Assistant to the President
Jane Dove

Data Processing Manager
Marian Riegle

MAPI'S MISSION

MAPI's mission is to promote and support the interests of manufacturing throughout the U.S. industrial sector. Its goals are to assist manufacturers in improving their productivity by stimulating investment in technology and by encouraging the development of product and process innovations, thereby enhancing their worldwide competitiveness.

MAPI fulfills its mission through policy analysis, management studies, information exchange, conferences, and executive development programs designed to prepare industry for the future.

In carrying out its work, MAPI relies heavily on the active involvement of chief executive officers and senior managers of its member companies. Support is provided by a full-time independent, professional and administrative staff which includes economists, lawyers, business researchers, and others with relevant training and experience.

The audience for the results of MAPI's research activities is broader than its member companies. MAPI's publication of some 100 reports annually brings public awareness to the importance of the industrial sector of the U.S. position in the international economy. MAPI also increases public recognition that government regulation of the market system involves tradeoffs. Some types of government intervention in private markets are, of course, justifiable, but when this is the case the need to minimize any adverse effects on the productivity of the industrial sector should guide how the government intervenes. In addition, in serving the public interest, the results of MAPI's research are communicated to key members of the Congress and to Administration officials, so that MAPI's professional analyses of issues may contribute to the quality of future policy decisions.

MAPI

Membership

Over the years as the structure of the U.S. economy has evolved, the industrial composition of the companies affiliated with MAPI has changed. The sales of MAPI companies continue to be heavily concentrated in manufacturing of both durable and nondurable products, although many of the larger companies have significant service operations and, for some members, services are the most important part of their business.

About 40 percent of MAPI companies' sales are in the production of machinery. There has been, however, a significant shift toward technologically sophisticated machinery with electrical machinery being the largest single category of manufacturing activity. Within this segment the sales of MAPI companies are concentrated in the high technology products of the growing information technology and communications equipment sector. MAPI continues to have the support of the major manufacturers of engines and farm and construction machinery.

Companies engaged in primary metals, fabricated metals, and instruments are a further important source of MAPI's support. In the transportation equipment sector, three major U.S. automobile companies and the extensive network of suppliers are important participants in the Alliance's activities as are U.S. aircraft manufacturers and the aerospace industry.

The MAPI membership now includes 21 of the top 25 electronics manufacturers and 44 of the top 50 defense manufacturers. In addition, some 30 major chemical producers and several major oil companies are participants in the Alliance. Indeed, MAPI companies are heavily represented in oil-related industries.

The unifying theme that attracts this wide range of industry participants is the type of services MAPI provides—the goal of these services is to promote technological advancement in the industrial sector and economic progress for all U.S. industry.

Organization

The MAPI president, who serves full time, is chief executive officer and acts as chairman of the Board of Trustees which consists of some 60 chief executive officers and presidents of a wide range of industrial companies. He is responsible for directing the MAPI program of research and analysis, policy statements, publications, conferences, and councils.

The president develops MAPI policy with the guidance of the Board which meets four times a year to analyze and discuss issues of critical importance to U.S. manufacturing. Basic policy for MAPI is established on the basis of these meetings. The Finance Committee of the Board provides internal guidance on financial and personnel matters.

Councils

A major part of the overall Alliance program is the work of its councils. Presently there are 22 active councils composed of over 1,600 executives of member companies. These groups have been organized in response to the need for seminar-like groups to meet and discuss challenges and problems in such areas as corporate planning, financial management, international operations, law, marketing, manufacturing, human resources, public affairs, government contracts, purchasing, products liability, hazardous materials management, risk management, quality assurance, and taxation. In addition, there is a council for presidents of small to mid-size companies.

Membership on MAPI councils is by invitation. Councils meet twice a year, in the fall and in the spring, for informal seminar-type discussions of problems of common interest.

The results of council discussion and research benefit the entire MAPI membership through Alliance publications and stimulation of staff thinking and planning.

Conferences

MAPI also conducts general conferences on subjects of current interest such as government procurement, federal taxation, employment law and human resources developments, benefit planning, health care costs, pension planning, workers' compensation, products liability, product quality improvement, environmental developments, financial reporting and disclosure, and significant international trade developments.

Each conference consists of two days of meetings with ample time allowed for questions from the audience. Member company officials as well as nonmembers attend the conferences.

[illegible]PI PRESIDENTS COUNCIL

Purpose

The formation in 1988 of a Presidents Council was prompted by suggestions from member company executives and the desirability of providing presidents with overall responsibility for corporate performance a forum to analyze critical issues affecting their industries.

Program

The major functions of the president-chief executive officer long have been: leadership, responsibility, and delegation. It is clearly a unique job and how it is performed is crucial to the success of the company. The president-CEO must operate within an environment of continuous, and at times dramatic, economic change. The decade of the 1980s experienced unprecedented swings in the exchange value of the dollar; commerce across national boundaries achieved new importance; mergers, acquisitions, joint ventures, and buyouts took place at an accelerated pace; and there was the maturation of a host of difficult problems, ranging from products liability to health care costs to environmental policies. And where do the "answers"—such as they are—lie? Within a peer group of presidents-CEOs.

In 1990, Council members discussed a number of relevant topics, including the following:

- Reorganizing a company to meet customer needs. The theme of "meeting customer needs" is developed at each meeting, with presentations on various aspects of quality improvement.
- Mergers and acquisitions. Related topics include joint mergers and strategic alliances.
- Critical issues in the motivation and management of human resources. This includes controlling health care costs and designing a drug-free workplace policy.
- Competing in global markets. This general theme includes strategies to stimulate exports as well as to break in to the foreign transplant market in the United States.
- Responding to product liability exposure. Council members present approaches to reducing this type of exposure as well as how to reform current liability law.
- Implication of higher oil prices. Executives from various industries analyze the effects of higher oil prices on their industries.

Finally, all Council members participated in informal roundtable sessions, exchanging views and experiences on common problems.

The Council—composed of presidents-CEOs—addresses issues that come before the president of a small- to medium-sized company. The size of the Council is limited to ensure seminar-type discussion, and continuity of participation by regular members of the group is strongly encouraged. Membership on the Council is restricted to presidents who, in addition to knowledge and experience, have a willingness to participate and contribute to Council discussions. The Council meets twice a year, in the fall and in the spring. Membership is by invitation.

MAPI PRESIDENTS COUNCIL

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Chief Executive Officer

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Chief Executive Officer

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Chief Executive Officer

Vickers, Incorporated
Maumee, Ohio
James McKee
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Chet S. Ross
Chairman, President and
Chief Executive Officer

Wean Incorporated
Pittsburgh, Pennsylvania
R. John Wean, III
President and
Chief Executive Officer

Staff Director to the Council
Kenneth McLennan
President

MAPI CORPORATE PLANNING COUNCIL

Purpose

The goal of the Corporate Planning Council is to provide a forum in which senior corporate planning and development executives can exchange views on all parts of their functions, including:

- — Goal-setting and the formulation and execution of strategies for achieving corporate goals;
- — Progress measurement, including reevaluation of objectives;
- — The identification and evaluation of corporate opportunities, threats, strengths, and weaknesses;
- — Contingency planning and crisis intervention;
- — Total and partial corporate redirection and redeployment, including resource allocation;
- — Adjustment to socioeconomic, political, geopolitical, and demographic changes;
- — Response to technological change and opportunities;
- — Market identification, analysis, extension, segmentation, and differentiation;
- — Manufacturing considerations and related technological developments; and
- — Acquisition, divestiture, and the management of growth.

Program

In addition to the exchange of ideas on such planning aspects as those listed under Purpose, the Council develops state-of-the-art information and data on substantive matters of special interest to corporate planners in such areas as: economic analysis; marketing research; productivity and quality; international competitiveness; the corporate response to social and environmental laws and regulations; and studies of new business ventures.

From an administrative vantage point, the Council considers such topics as the planning organization and staff; reporting relationships; the planning "charter" and procedures; automation—including computer modeling—in the planning function; planning committees and other support units; the use of outside consultants; performance evaluation; compensation; recruitment and training; patterns of change in the function, including elevation, decentralization, coverage, and other staff involvement; the gathering of business intelligence; how to maintain confidentiality; and regulatory, organizational, and other aids and impediments to the planning mission.

More specifically, in the last year, members of the Corporate Planning Council discussed the following subjects, among others:

- — Emerging Markets, National Security, and Deficit Reduction
- — Variables in Forecasting
- — Using Consultants To Find Acquisition Candidates
- — Nonfinancial Criteria for the Justification of Major Capital Spending
- — The Changing Work Force, New Technologies, and the "Education Deficit"
- — Business Intelligence and the Element of Surprise
- — Portfolio Mix Planning
- — Corporate Culture in Transition
- — Reconciling Corporate Planning and Cash-Flow Objectives
- — Plan Implementation and Integration
- — Revising the Corporate Planning Process
- — Defining Strategic Business Units
- — Acquisitions, Divestitures, and Environmental Law
- — The "10 Commandments" of Successful Acquisitions
- — A Technique for Analyzing "Business Health"
- — The Oil Shock, Budget Reconciliation, and the Business Outlook

MAPI CORPORATE PLANNING COUNCIL

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Vice President-Corporate Planning

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Anthony Zettlemoyer
Director, Corporate Planning

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Rrepresentative to be Designated

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and Corporate Development

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Director, Corporate Development

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Lawrenceville, New Jersey
Clinton S. Mathews
Vice President Technology &
Corporate Development

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Vice President, Planning and
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Latrobe, Pennsylvania
Gary W. Weismann
Manager of Corporate Financial Planning

3M Company
St. Paul, Minnesota
William E. DeGenaro
Director, Business Research and Analysis

The Manitowoc Company, Inc.
Manitowoc, Wisconsin
Representative to be Designated

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Staff Vice President, Strategic Business Development

NACCO Industries, Inc.
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Vice President

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Mailing Systems

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Vice President, Strategic Business Development

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Peter M. Turner
Vice President Business Development

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Frank J. Herzmann
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Thomas K. Clarke
Vice President-Corporate Development

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Director of Corporate Development

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Paul W. Lassanske
Director, Strategic & Operations Analysis

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TRW Information Systems

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J. Leckie Rives
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Richard D. Neece
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Staff Director to the Council
Francis W. Holman, Jr.
Vice President and Secretary

MAPI FINANCIAL COUNCILS

Purpose

The Alliance has three Financial Councils to serve the interests of the membership. Membership in each of the three Councils is composed of approximately 70 representatives of member companies. The majority of Council members are chief financial officers. These Councils have three main purposes:

1. To provide a forum for the discussion of financial management, treasury, and controllership matters of interest to manufacturers and providers of related business services.

2. To serve as a clearinghouse for the receipt and dissemination of financial management information to all members of the Alliance.

3. To assist the MAPI staff as it develops related MAPI policy and studies of current business practices.

Program

The program of the Councils covers all company affairs associated with finance and accounting—for example, financial organization; budgeting and forecasting; cash management; cost reduction; external financing; credit and collections; reporting to management, shareholders, prospective investors, and government; internal and independent audit; securities regulation generally; financial accounting standards; management information systems; internal accounting controls; capital expenditure systems and controls; acquisitions and divestitures; tax and risk management; pension management; financial public relations; and international financial dealings.

Topics discussed in 1989-90 by members of the three Financial Councils included:

— Techniques of Divestiture
— Financial Public Relations Under Conditions of Adversity
— Doing Business in Eastern Europe
— Approaches to a "Continuing Education" Business Environment
— The Great FY '91 Budget Controversy
— Experiences With Credit-Rating Bureaus
— Executing a Leveraged Recapitalization
— Takeovers and Public Policy
— Memorable Tax Audit Experiences
— Activity-Based Cost Accounting
— Demographics and Benefits Policy
— Customer Orientation and Service Commitment in Controllership
— Results of a Survey on Banking Services and Costs
— Techniques of Cash-Flow Forecasting
— Allocation of Central-Office Expense
— Decentralization as an Element of Restructuring
— Cost Reduction in White-Collar Functions
— Adding Shareholder Value
— The Revived Interest in Convertible Securities
— Using Market Auction Securities To Reduce the Cost of Capital

In connection with the Councils' activities, Alliance staff research has been broadened on such subjects as planning and management development. In addition, MAPI has addressed such matters as the Financial Accounting Standards Board's statements, SEC rulings, IRS rulings, and legislative, administrative, and judicial activities covering pensions, antitrust, taxation, government contracts, and various forms of government controls.

MAPI FINANCIAL COUNCIL I

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Vice Chairman

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Vice President & Controller

ABB Flakt, Inc.
Atlanta, Georgia
Eric Petersson
Vice President, Finance

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Charles Toder
Controller

AM International, Inc.
Chicago, Illinois
Steven F. Kaplan
Senior Vice President-Finance
and Corporate Strategy

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Gary B. Montgomery
Controller

Arvin Industries, Inc.
Columbus, Indiana
Richard A. Smith
Vice President-Finance

AT&T Technologies, Inc.
Morristown, New Jersey
Stephen M. Carson
Vice President & Chief Financial
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Bethlehem, Pennsylvania
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Chief Financial Officer

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Chief Financial Officer

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Vice President and Treasurer

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Gene P. Jaggers
Vice President-Finance & Treasurer

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Vice President and
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John E. Powers
Senior Vice President

Eaton Corporation
Cleveland, Ohio
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Purpose

The purpose of the MAPI Government Contracts Council is to provide a forum for the exchange of ideas and experiences on matters of mutual interest among a group of member company executives who share major responsibilities in the field of govement contracts, although their specific duty assignments may be in marketing, operations, law, finance,contract administration, or other areas.

Program

Within the last year, Council discussions have focused on such subjects as:

— Addressing Changes in the Military Threat to Our Nation and Dealing With Cutbacks in Defense Expenditures
— The Defense Management Review—Industry Reaction to Implementation of Its Recommendations
— Update on Defense Procurement Policy Legislation
— Increased Emphasis on Total Quality Management Concepts in Defense Programs and Products
— Increasing the Use of Commercial Products by the Government
— Increasing Government Intervention in Business Ethics—"The Byrd Amendment," Procurement Integrity, and Other Procurement Ethics Reform Legislation
— Contractor Ethics Programs and Their Effectiveness Against Government Prosecutions
— Dealing With the Government's Drug-Free Workplace vs. Work Force Rules—Drug Testing Issues and Employee Rights.
— Contractor Treatment of Allowable, but "Controversial," Cost Items
— Contract Audit Issues, Including Defective Pricing and Access to Internal Records Problems
— Recent Developments Affecting Contractor Rights in Proprietary/Technical Data
— Contractor Experiences With Contractor Material Management and Accounting Systems (MMAS) and the Contractor Risk Assessment Guide (CRAG) Program
— The Impact of DOD's Current Policy on Recoupment of Nonrecurring Costs.

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Westinghouse Electric Corporation
Baltimore, Maryland
Thomas J. Cogan
Controller
Electronic Systems Group

Woodward Governor Company
Rockford, Illinois
John L. Svendsen
Manager of Government Accounting

Staff Director to the Council
Elaine J. Guth
Attorney

MAPI HAZARDOUS MATERIALS MANAGEMENT COUNCIL

Purpose

The Council is composed of company executives with major responsibilities for environmental affairs and hazardous materials management. Its purpose is to provide a forum for the exchange of practical and timely information concerning the increasingly complex technical, legal, and regulatory requirements that apply to Council members' functional responsibilities and to discuss techniques for their effective management. The complete range of environmental issues and concerns of U.S. manufacturers are covered in the Council program.

As shown by the membership list, a balance is maintained among the different disciplines involved in environmental and hazardous materials management. The range of product lines and operations of the companies represented on the Council assures a thorough examination of the various environmental issues that affect U.S. manufacturers.

Program

Some of the management, regulatory, and technical subjects dealt with in Council meetings have included the following topics:

— Establishment and Implementation of Corporate Environmental Policies and Programs
— Environmental Compliance Reviews
— Environmental Training: Linear and Interactive Videos
— Environmental Computer Information and Data Base Systems
— RCRA Cleanups vs. Superfund Cleanups: Strategic Decisions; Strategic Options
— Company Programs and Industry Efforts To Reduce CFC Use
— Working With SARA Title III Local Emergency Planning Committees
— Meeting State and Local Environmental Requirements
— Constructing and Operating a Groundwater Recovery/Treatment System
— Methods To Minimize the Generation of Hazardous Waste
— Air Emissions Control Programs
— Evaluating Environmental Testing Laboratories
— Techniques for the Removal of Underground Storage Tanks
— Application of Prior Liability Insurance Policies to Pollution Damages and Cleanup Costs
— Handling Environmental Liabilities in Acquisitions and Divestitures
— State Laws Affecting Commercial Property Transfers
— Personal Environmental Liabilities of Corporate Officials
— Third-Party Lawsuits for Exposure to Hazardous Substances

MAPI HAZARDOUS MATERIALS MANAGEMENT COUNCIL

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Environmental Technology Department

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Benson Klingler
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Health and Safety

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Environmental Control
Battery Group

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Trade Regulations &
Environmental Affairs

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D. Thomas Carlton
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Environmental Affairs

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Management Task Force

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Paul J. Eisele
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Environmental Affairs

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Joseph H. Copeland
Director-Health, Safety and
Environmental Affairs

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Corporate Real Estate and
Environmental Affairs

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Manager, Environmental Control

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Edith M. Ardiente
Manager, Environmental Affairs

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Ann C. Pizzorusso
Director, Environmental Affairs

Northrop Corporation
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Thomas J. McCabe, Jr.
Corporate Environmental Control
Administrator

Owens-Corning Fiberglas Corporation
Toledo, Ohio
D. G. Schlaudecker
Director, Environmental Affairs

Parker Hannifin Corporation
Cleveland, Ohio
Richard S. Kanzleiter
Director of Environmental Affairs

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Kenneth J. Tierney
Director, Environmental and Energy
Conservation

Reliance Electric Company
Cleveland, Ohio
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Manager, Industrial Hygiene and
Environmental Affairs

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Director, Corporate Environmental
Control

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Energy Conservation

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Manager, Environmental Services
Ryder Transportation Resources

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Risk Management Department

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Dani Tsuda
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Services

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Director, Environmental Control

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Cleveland, Ohio
James E. Calhoun
Vice President-Regulatory Affairs

Staff Director to the Council
Richard H. Robinson
Attorney

MAPI HUMAN RESOURCES COUNCILS

Purpose

The Human Resources Councils have two major purposes:

1. To provide a forum for the informal discussion of human resources problems facing manufacturers.

2. To serve to the extent appropriate as a clearinghouse for the receipt and dissemination of human resources information to all members of MAPI.

Program

The program of the Councils covers the wide variety of topics that fall under the broad concept of human resources. For example, at recent meetings of the two Councils, the following subjects were discussed by Council members:

— Adopting a Government-Subsidized Training Program for Shop Personnel
— Recent Company Experience With ESOPs
— Achieving an Early Collective Bargaining Settlement
— Training for Leadership
— Negotiating Health Care Benefit Changes
— Two Perspectives on Achieving Total Quality
— Administering a Point-of-Service Health Care Plan (Networks)
— Should Early Retirement Inducements Be Eliminated?
— Assimilating Mergers and Acquisitions: A Look at the Issue From Both Sides of the Fence
— Communicating Change in Employee Benefits

In support of the Councils' work, the MAPI staff has undertaken research on such subjects as health care cost containment, demographic changes, productivity improvement, the economic issues involved in employer costs for employee compensation, and the gap in compensation costs among countries. Also, research time has been devoted to such matters as the law governing employment discrimination, modifying retiree health benefits, and management strategies for controlling workers' compensation and, in each instance, has resulted in a published MAPI study or report. (See section on MAPI Publications for a list of current studies and reports in human resources.)

MAPI HUMAN RESOURCES COUNCIL I

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Industrial Relations

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Administration

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Vice President of Human Resources
and Administration

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Bridgeton, Missouri
Jean C. Evans
Vice President-Human Resources

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Jacksonville Beach, Florida
Gilbert J. Pomar, Jr.
Human Resources Consultant

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Glenview, Illinois
John Karpan
Vice President-Human Resources

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Resources

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Robert G. Ripston
Vice President-Human Resources

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David R. Downs
Vice President-Human Resources

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Vice President-Human Resources

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Jon B. Middleton
Vice President-Human Resources

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Company**
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Vice President-Human Resources

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Patricia Buckley
Economist

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Newport News, Virginia
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Group Vice President & Secretary

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Litchfield, Michigan
Charles K. Winter
Vice President, Human Resources

SPX Corporation
Muskegon, Michigan
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Ames, Iowa
Gregory Wuhs
Vice President, Administration

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John F. Walsh
Vice President-Human Resources

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Vice President, Human Resources

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Corporate Member Relations Manager

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Staff Director to the Council
Leslie D. Miller
Attorney

MAPI INTERNATIONAL OPERATIONS COUNCIL

Purpose

The MAPI International Operations Council meets the needs of senior executives responsible for the growing importance of trade and international business issues to companies in the U.S. industrial sector.

The purpose of the Council is to provide a forum for discussion of the sales, investment, manufacturing, licensing, financial, and general managerial problems associated with foreign operations and to examine the impact of government policy and regulations on trade issues.

Program

In its consideration of the operational problems encountered by member company industries in the international field, the program of the International Operations Council gives attention to four broad areas: (1) organization and management of international operations; (2) international marketing, licensing, and investment; (3) international finance; and (4) taxation and trade regulation.

Over the last year, Council members discussed a wide variety of subjects in the international field, including the following: the "Europe 1992" program and its impact on individual U.S. industries; joint ventures and other activities in the Soviet Union, other East European countries, and the People's Republic of China; global sourcing programs; strategic alliances with foreign firms; worldwide quality improvement and manufacturing programs; protection of intellectual property rights; global information systems; and expatriate compensation.

Through the meetings of the International Operations Council and related MAPI staff research, the Alliance has developed an extensive background of experience and documentation in foreign operational problems. This information and data are made available to the membership through publications relating to capital goods exports (including export financing), direct investment flows, and U.S. government regulation of foreign trade. (A list of publications in the international operations field appears in the Publications section of this "Guide.")

In addition, the work of the Council has been invaluable in the preparation of research studies on international investment flows and in the formulation of Alliance statements to congressional committees and government agencies on such matters as export financing, export controls, economic sanctions, and the taxation of foreign-source income.

Council deliberations also stimulate the organization of ad hoc conferences on foreign trade and international operations.

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MAPI LAW COUNCILS

Purpose

The MAPI Law Councils provide forums for the exchange of ideas and experiences among groups composed primarily of senior corporate general counsel within member companies who are involved both in providing legal advice and counsel to top corporate management and in the operation and administration of corporate law departments. MAPI now has two Law Councils to serve the interests of the membership.

Program

In recent years, U.S. business has been impacted very substantially by a proliferation of socioeconomic programs of government and extensive regulation at both the federal and state levels. This has increased the burden on and enlarged the role of the chief corporate legal officer and the corporate law department in reference to the conduct of corporate affairs.

In a related trend, outside legal costs to the corporation have been escalating with the result that corporations have been compelled to provide closer internal oversight with respect to such costs and to consider the desirability of performing a larger amount of necessary legal work inside the company. Also, in respect to corporate governance, corporations have either taken the initiative or in many cases have been required to develop internal corporate policies and procedures and reshape the corporate organization. This has been true in such areas as the activities of an audit committee, the responsibilities of the board of directors, financial reporting and disclosure, reevaluation of internal accounting controls, closer oversight of international operations, etc., all of which involve the need for legal advice and services.

The programs of the Law Councils reflect these developments. The Councils typically include on their meeting agendas such items as new major federal statutes and litigation of concern to business, new and changing regulatory matters, requirements relating to corporate finance and accounting which have significant legal implications, products liability, hazardous materials disposal and other environmental issues, workers' compensation, federal tax issues, international business problems, human resources, important antitrust developments, key government contract legal issues, etc.

The Councils are equally concerned with the operation of corporate law departments and legal functions generally and how these operations can be conducted with maximum effectiveness, efficiency, and economy.

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[redacted]PI MANUFACTURING COUNCIL

Purpose

The principal purposes of the Council are as follows:

1. To exchange experiences and to consider the total operating policies and practices of the senior manufacturing executive.

2. To bring information on these subjects to the attention of manufacturers generally through periodic publication of materials on advanced manufacturing management techniques. The Council reports and discussions also provide valuable input for MAPI publications in related areas such as human resources, health and safety, etc., and their relationship to other company functions; the quality process; materials management; cost reduction and profit improvement; manpower planning and development; and innovations in manufacturing, including computer-assisted design, computer-integrated manufacturing, flexible manufacturing systems, just-in-time manufacturing, and robotics.

Program

The MAPI Manufacturing Council was established in recognition of a need among member companies for a forum in which the manufacturing problems of industrial companies can receive continuing and intensive study by top executives experienced in this area.

The Council considers the problems of manufacturing from the viewpoint of the top manufacturing executive; it does not become involved in local survey activities or the formulation of technical standards such as those customarily handled by local groups or single-product associations.

As in the case of the Alliance's other councils, the MAPI Manufacturing Council comprises a relatively small group, the caliber and general level of responsibilities of its participants being most important to its success and growth.

The Council examines and discusses a wide range of subjects, including: implementation of machining centers and computer-integrated manufacturing; total quality programs; manpower planning and development; environmental and safety programs; corporate data communications networks; inventory management; purchasing strategies; gain sharing; and white collar productivity.

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MAPI MARKETING COUNCIL

Purpose

The Marketing Council was established in recognition of the need for improvement in the marketing activities of manufacturers in the industrial sector and of business-to-business marketing more generally. Accordingly, the Marketing Council addresses itself to three basic objectives:

1. To benefit Council participants through the interchange of ideas, experience, and analysis of case studies concerned with marketing goals and problems.

2. To bring information on these subjects to the attention of manufacturers generally through publication of specialized materials.

3. To promote programs on industrial marketing at educational institutions and professional marketing groups.

Program

The Marketing Council provides a focal point for the study of marketing methods in the industrial sector of the economy. It concentrates on industrial, i.e., company-to-company, marketing issues. Council discussions have also stimulated MAPI staff research and publication in the marketing field.

Council activity includes consideration of all aspects of company problems and opportunities in marketing—for example, anticipation of market trends; marketing and the computer; integrated product planning; sales training and management; distribution methods; strategic planning; market share and profits; and mergers and acquisitions. Marketing is approached from a global standpoint covering the U.S. economy and international markets.

Council discussions include a variety of marketing subjects. For example, at a recent Council meeting, several members reviewed the U.S. trade program and the effect of trade patterns upon their particular products. Another Council member discussed some criteria for designing sales incentives programs that had emerged from a number of experiments in his company with programs of this sort. One member, representing a relatively small company consisting of a number of independent divisions, described an approach his company has taken to devise a strategy for doing business in some or all of the countries in the Pacific rim. Other Council subjects have included: "The Role of Advertising in Industrial Marketing From a Company Perspective"; "Sales Forecasting in the 1990s"; "Marketing Audits"; "Developing a Business Strategy"; and "New Supplier Responsibilities."

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[illegible]PI PRODUCTS LIABILITY COUNCIL

Purpose

The purpose of the MAPI Products Liability Council is to provide a forum for representatives of manufacturers to discuss products liability problems and their prevention in an off-the-record, informal setting. Emphasis is placed on the exchange of timely, in-depth, and practical information and data which are drawn from the members' own experiences with product safety and liability programs and techniques, claims handling, litigation, insurance, etc. As indicated by the Council membership list, the multidisciplinary nature of the Council membership and the wide range of product lines of the companies represented on the Council assure comprehensive examination of issues.

Program

Representative of the timeliness and range of subjects addressed by the Council are the following reports from recent Council meetings:

- — Using the Decision Tree as a Tool in the Pre-Litigation Process
- — Managing Product Recalls
- — Liability of Successor Corporations for Products Manufactured by a Predecessor Corporation: Developments in P&E Law
- — Recent Developments in U.S. State and Federal Tort Reform
- — U.S. Manufacturers' Liability and EC Council Directives on Products Liability: What Lies Ahead?
- — Mass Tort Crisis: Impact on U.S. Tort Litigation System; Useful Defense Strategies; and Possible Procedural Reforms
- — Litigation Cost Control Matrix—An Effective Quantitative Approach To Controlling Litigation Costs
- — Discovery of Products Liability Records
- — Human Factors Solutions in Product Accident Prevention
- — Litigating Punitive Damages in Products Liability
- — The Relationship Between the Carrier and the Insured in Products Liability Litigation
- — Use of Laser Disc Technology as Demonstrative Evidence at Trial

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Lawrence R. Herman
Attorney

MAPI PUBLIC AFFAIRS COUNCIL

Purpose

This discussion group addresses the full scope of the public affairs function in corporations, including corporate communications, investor relations, community relations, government affairs, and corporate giving. For that reason, priority in the selection of Council members is given to that executive who has been officially designated within the corporation as principal public affairs or corporate relations officer. In addition to addressing legislative and regulatory developments at the federal level, increasing attention is being given to laws and regulations having an impact on business at the state and local levels. The Public Affairs Council also assists MAPI management in identifying emerging public policy issues to which MAPI research should be addressed.

Program

In its analysis of public policy issues, the Council features discussion of appropriate corporate responses and initiatives. Meetings include member presentations, a roundtable discussion session, and occasional presentations by outside speakers. Recent agenda subjects include:

— The Future Direction of U.S. Tax and Fiscal Policies
— Campaign Financing Reform and a Reassessment of the Corporate Political Action Committee
— U.S. Competitiveness in Global Markets
— National and State Environmental Policies
— The Role of Business in Education and Training
— Health Care Options for Business and for Society
— Developing and Implementing a Corporate Code of Ethics
— National Energy Policy
— Community Relations Implications of Hazardous Materials
— Reexamining Corporate Governance in the Age of the Unfriendly Takeover Bid
— The Economic Outlook for U.S. Manufacturing
— The Liability Crisis and Tort Reform
— Impact on Industry of Changes in Defense Department Policy and Funding
— Managing Employee Privacy Issues, Including Drugs, Alcohol, Smoking, and AIDS
— Preparing for EC 1992
— Human Resources Issues Involved in Restructuring, Plant Closing, and Layoffs
— The Growing Role of Women in Corporations and the Issue of Comparable Worth
— Trends in Corporate Public Affairs Management

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Government Relations

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Peggy Morrisaette
Director of Public and Government
Affairs

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MAPI PURCHASING COUNCIL

Purpose

The principal purposes of the Purchasing Council are as follows:

1. To provide a forum for the exchange of experiences and consideration of the policy and operating problems of senior-level purchasing executives.

2. To develop and bring into sharper focus the contributions that purchasing executives can make in the business firm.

3. As a byproduct, to bring information on the purchasing function to the attention of capital goods companies generally through the publication of advanced and specialized materials on management problems.

The Purchasing Council actively participated in the ground-breaking series of MAPI Surveys on Global Sourcing. Also, MAPI has published papers prepared by members of the Purchasing Council in a book entitled *The Purchasing Function: From Strategy to Image—A Sampler*.

Program

The Purchasing Council spearheads MAPI activities concerning the procurement function (i.e., the purchase of goods, services, equipment, and supplies) of MAPI member companies. It was established in response to numerous requests from manufacturers and in recognition of a need for some medium through which the purchasing problems can receive continuing and intensive study by top-level executives experienced in purchasing. The Council membership and its program reflect a recent recognition of the critical importance of the purchasing function and the significant upgrading of purchasing officials in the corporate organization.

The MAPI Purchasing Council concerns itself primarily with the policy and operating problems involved in procurement at the senior executive level. At the same time there is discussion of such related subjects as: global sourcing; vendor quality improvement programs; materials management; evaluating purchasing performance; the purchasing function and cost reduction and profit improvement; decentralized vs. centralized purchasing activities; and management development and recruitment for purchasing.

In 1990 the Purchasing Council discussed the following subjects:

- — Purchasing's Role in Cross-Functional Teams
- — Moving From Purchasing to Supply Management
- — The Baldrige National Quality Award
- — What's Stopping EDI?
- — Purchasing Freight Transportation
- — Purchasing Other Services
- — The Pre-Launch Process
- — Benchmarking Quality
- — Partnering
- — Software Licensing Agreements
- — Supplier Quality Profiles
- — Improving Quality Through Purchasing
- — Critical Materials Strategies

MAPI PURCHASING COUNCIL

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Willoughby, Ohio
Paul R. Kearney
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Beverly S. Guin
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Purchasing

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and Purchasing

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Terrance M. Doyle
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Yale Materials Handling Corporation

Navistar International Transportation Corp.
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John R. MacLean
Vice President of Materials
Management

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James H. Currier
Assistant Vice President, Corporate
Purchasing

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Newport News, Virginia
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Norton Company
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George F. Bernardin
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and Transportation

Outokumpu American Brass
Buffalo, New York
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Toledo, Ohio
Frank W. Como
Vice President, Corporate
Purchases & Transportation

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Warren E. Norquist
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and Materials Management

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Charles E. Bunch
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Premark International, Inc.
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John J. Nicastro
Corporate Director Purchasing,
Materials and Transportation

Racal-Milgo Inc.
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F. Brian Fullmer
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Martin J. Kane
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Reliance Electric Company
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H. James Murdoch
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Reynolds Metals Company
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Rockwell International Corporation
El Segundo, California
James M. Kerr
Director, Materiel & Systems

Sara Lee Corporation
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Raymond C. Howick
Director, Corporate Purchasing & Logistics

Siemens Energy & Automation, Inc.
Atlanta, Georgia
William G. Lange
Manager, Corporate Purchasing/Logistics and Administrative Services

Simpson Industries, Inc.
Litchfield, Michigan
James W. Cooper
Vice President Materials Management

SPX Corporation
Muskegon, Michigan
Michael De Podesta
Director of Procurement & Quality Certification
Sealed Power Replacement

Square D Company
Schaumburg, Illinois
Richard L. Hottinger
Corporate Director of Purchasing

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Tektronix, Inc.
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Bonita J. Sullivan
Director, Corporate Procurement and Logistics

Texas Instruments Incorporated
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Vice President, Corporate Staff, and Director, Corporate Procurement

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Canton, Ohio
Stephen A. Perry
Director-Purchasing and Logistics

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National Purchasing Manager

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Union Carbide Chemicals and Plastics Company, Inc.

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Eugene C. Skutt
Vice President Purchasing

Whirlpool Corporation
Benton Harbor, Michigan
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Corporate Director Procurement
North American Appliance Group

Xerox Corporation
Webster, New York
Raymond C. Stark
Vice President, Materials Management

Staff Director to the Council
Jerry J. Shipley
Economist

MAPI COUNCIL ON QUALITY

Purpose

The Council on Quality is the newest council in MAPI's extensive council structure, having held its first meeting in fall 1989. It seems especially useful to organize the Council on Quality at this time. In today's global competition, quality improvement and cost reduction are critical to the success of individual operations. Further, innovative concepts, programs, and techniques are now coming to the fore from a broad variety of sources so that the cross-fertilization of ideas can be most fruitful. Finally, much of the leadership—and certainly the hands-on experience—in this area resides in the MAPI membership. This provides an unequalled opportunity to further the contribution of the capital goods and allied product industries to America's competitive ability.

The Council on Quality consists of a peer group of senior managers—those whose task is to promote and assist in the implementation of the most advanced and highest quality goods and services available; more specifically, those executives who are responsible for corporate quality improvement and who are interested in and capable of new directions for quality improvement.

The primary purposes of the Council on Quality are twofold:

1. To provide a forum in which senior quality executives explore all aspects of quality requirements, including quality as a critical source of productivity improvement, management leadership, process/product excellence, employee participation, supplier involvement, and customer needs; and

2. To promote peer group interchange among quality executives representing firms engaged as sellers, suppliers, and purchasers of capital goods and allied industrial equipment.

Program

The seminar-type sessions consist of presentations or case studies by individual members of the Council with "hands-on" experience. Extended question-and-answer periods follow. Subject matter is generated by the Council members. Among the topics discussed at recent meetings were:

— An Internal Quality Award System for Training and Education
— Reorganizing a Manufacturing Company To Meet Customer Needs
— Customer Satisfaction Analyses
— An American Consensus Standard for Quality and ISO 9000 International and ISO 9000 International Quality Standard
— The Cost of Quality
— Quality Strategies for Vendor Relations
— A Strategy and Some Tactics for Implementation of Total Quality
— In Search of Improved Productivity
— Interfacing With a Bargaining Unit

MAPI COUNCIL ON QUALITY

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Don F. Pankey
Director of Quality

Air Products and Chemicals, Inc.
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Corporate Director, Productivity
and Quality Systems

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Ron Blachowski
Manager, Quality Control
Industrial Control Group

Aluminum Company of America
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Vice President, Quality

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Vice President-Corporate Quality

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Continuous Quality Improvement

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Alloy Division

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Engineer-Worldwide

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Metal Products Group

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Forged Products Division

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Vice President-Quality
Engine Business Division

Dana Corporation
Ottawa Lake, Michigan
Royce A. West
Manager of Education
Dana University Technical School

The Dexter Corporation
Windsor Locks, Connecticut
John E. Anderson
Vice President-Total Quality Systems
Specialty Materials & Services
Group

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President
Steam Turbine, Motor & Generator

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Reliability Assurance

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William R. Carey
Director, Quality and Engineering
Development

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Donald A. Ogilvie
Director, Quality Assurance
Government Systems Division

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Edison, New Jersey
Jerry D. Moore
Corporate Director of Quality

The Falk Corporation
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Chassis Products Operations

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Marshalltown, Iowa
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Quality Director
Final Control Systems

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Stanley G. David
Director of Quality

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Vice President-Corporate Technology

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Seneca Falls, New York
Carl Weissgerber
Director of Total Quality

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Milwaukee, Wisconsin
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Harnischfeger Corporation

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Assurance

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Bucky L. Lord
Executive Director of Engineering
Hill-Rom

Honeywell Inc.
Minneapolis, Minnesota
Arnold M. Weimerskirch
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Hubbell Incorporated
Bridgeport, Connecticut
Robert M. Grossman
Division Quality Manager
Wiring Device Division

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Los Angeles, California
Richard E. Tracey
Director, Corporate Quality

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Purchase, New York
D. E. Davis
Program Director, Manufacturing

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David T. Windmuller
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General Manager
ITW Southern Gage

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Richard W. Frint
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Special Machines Group

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Woodcliff Lake, New Jersey
James F. Lahey
Director, Total Quality Leadership

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Metalworking Systems Division

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Manager, Quality Assurance

The Lincoln Electric Company
Cleveland, Ohio
William Downing
Quality Assurance Manager
Machine and Motor Division

LTV Steel Company
Independence, Ohio
Brian Attwood
General Manager, Research
and Quality Control

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James H. Childress
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and Quality Assurance
Ride Control Products Division

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Richard C. Buetow
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Motorola Director of Quality

Newport News Shipbuilding
Newport News, Virginia
Robert R. Hardison
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Nordberg, Inc.
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Vijia K. Karra
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Northern Telecom Inc.
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Outboard Marine Corporation
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Dean P. Bergman
Director, Quality Assurance

Outokumpu American Brass
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Vice President-Operations

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Toledo, Ohio
Craig Burroughs
Technical and Quality Assurance Manager
Insulation Operating Division

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Parkson Corporation
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Glass Group

Premark International, Inc.
Troy, Ohio
James T. Schutta
Director, Quality Assurance
Food Equipment Group

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John R. Waller
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Manufacturing Operations

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SPX Corporation
Owatonna, Minnesota
Larry Stordahl
General Manager
OTC Power Team

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Supplies, Development & Manufacturing

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MAPI Consultant

MAPI RISK MANAGEMENT COUNCILS

Purpose

The MAPI Risk Management Councils provide a forum in which companies within the MAPI membership informally discuss the problems of risk and insurance management and employee benefits. Membership on the Councils is limited to corporate risk or insurance managers or those with major risk management responsibilities. The principal purposes of the Risk Management Councils include:

1. The exchange of experience on, and consideration of, common problems of risk management, including insurable hazards, availability of coverages, loss experience, claims handling, etc.

2. The opportunity for informal discussion of corporate pensions, group life, accident, health, and similar employee benefit plans.

Program

The program of the group is, of course, oriented toward the risk management—including insurance—problems of MAPI member companies. Such matters as the following are reviewed on a periodic basis: the management role of the risk manager; underwriting capacity and the worldwide insurance market; methods of financing company insurance and employee benefit programs (e.g., captive insurance companies, self-insurance, rating systems, etc.); company products liability programs; administering worldwide insurance programs; mass merchandising of personal insurance; governmental developments affecting corporate insurance and pension plan programs; the problems of group insurance plans; occupational safety and health laws; and the creation and management of captive insurance companies.

Council discussions have stimulated Alliance research and publication in areas such as crisis management, strategies for protecting corporate directors from the threat of personal liability, the cost and availability of certain property and casualty insurance coverages, the claims-made approach to liability coverage, workers' compensation, employee benefits, foreign insurance markets and company programs, and self-insurance.

MAPI RISK MANAGEMENT COUNCIL I

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Vice Chairman

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Associate Director-Risk Management

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Paoli, Pennsylvania
Henry C. Klein
Supervisor, Cash & Insurance

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Stamford, Connecticut
Charles J. Salek
Managing Director
Risk Management Services

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Berkeley Heights, New Jersey
Barbara M. Babiak
Treasury Director
Risk Management

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Director-Corporate Risk Management

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Director, Employee Benefits and Risk Management

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Manager, Insurance & Risk Management

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Vice President/Risk Management and Corporate Services

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Houston, Texas
Robert W. Teets
Director, Risk Management & Environmental Affairs

CRL, Inc.
Des Plaines, Illinois
Norman A. Kenney
Risk Manager

Cummins Engine Company, Inc.
Columbus, Indiana
Mark W. DeBolt
Director-Corporate Risk Management

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Toledo, Ohio
Dennis L. Bennice
President
Dana Risk Management Services, Inc.

Deere & Company
Moline, Illinois
Marc S. Middleton
Vice President
John Deere Insurance Group

Eagle-Picher Industries, Inc.
Cincinnati, Ohio
Vincent M. Rhoney
Director of Risk Management

Eaton Corporation
Cleveland, Ohio
Gerald W. Smith
Manager-Corporate Risk

Emerson Electric Co.
St. Louis, Missouri
Paul E. Morrison
Director-Risk Management

Engelhard Corporation
Edison, New Jersey
Jesse Pagonis
Director of Corporate Insurance

Federal-Mogul Corporation
Detroit, Michigan
Ronald W. Stasch
Manager, Risk Management Services

Figgie International Inc.
Willoughby, Ohio
Roy J. Villella, Jr.
Corporate Risk Manager

FMC Corporation
Chicago, Illinois
Randall J. Woods
Director, Risk Management & Benefits Administration

The Foxboro Company
Foxboro, Massachusetts
Bruce E. Wilson
Corporate Risk Manager

GATX Corporation
Chicago, Illinois
Arthur H. Melzer
Director, Corporate Insurance

GenCorp
Fairlawn, Ohio
Thomas J. Rittenhouse
Director of Risk Management

General Electric Company
Fairfield, Connecticut
Ints Rupners
Manager-Casualty

General Motors Corporation
Detroit, Michigan
R. Paul Maddock
Director of Risk Management

The Gillette Company
Boston, Massachusetts
William L. Mather
Director, Risk Management

GTE Service Corporation
Stamford, Connecticut
William L. Hyland
Vice President-Insurance

Guardian Industries Corp.
Northville, Michigan
Thomas E. Boss
Manager of Risk Management

Harris Corporation
Melbourne, Florida
Donald J. Sullivan
Manager, Corporate Risk Management

Harsco Corporation
Camp Hill, Pennsylvania
Stephen E. Baney
Insurance Manager

Hewlett-Packard Company
Palo Alto, California
Richard A. Wilson
Corporate Risk Manager

Hubbell Incorporated
Orange, Connecticut
Raymond J. Alletto
Risk Manager

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Lawrenceville, New Jersey
Ann Zielinski
Insurance Administrator/Assistant Secretary

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Milwaukee, Wisconsin
Gary J. Bridgeford
Director, Corporate Risk Management

Litton Industries, Inc.
Beverly Hills, California
Wayne R. Bergstrom
Corporate Risk Manager

Lucas Industries Inc.
Reston, Virginia
Terry D. Van Vuren
Manager, Risk and Insurance

3M Company
St. Paul, Minnesota
Thomas V. Hugdahl
Manager-Insurance

McDermott Incorporated
New Orleans, Louisiana
J. Burns Smith
Director, Insurance and Risk Management

Motorola Inc.
Schaumburg, Illinois
Joseph J. Wojdula
Manager, Corporate Insurance

National Forge Company
Irvine, Pennsylvania
Robert A. Kaemmerer
Risk Manager

Navistar International Transportation Corp.
Chicago, Illinois
Douglas C. Nyhus
Manager, Corporate Insurance

North American Philips Corporation
New York, New York
Thomas J. Hassett
Director, Corporate Risk Management

Northrop Corporation
Los Angeles, California
Gary K. Brucker
Manager, Corporate Risk Management

PPG Industries Inc.
Pittsburgh, Pennsylvania
Frank W. Finley
Assistant Treasurer

Raychem Corporation
Menlo Park, California
John W. Schaefer
Corporate Risk Manager

Rexnord Corporation
Milwaukee, Wisconsin
Ralph E. Adams
Risk Manager

Reynolds Metals Company
Richmond, Virginia
William H. Murphy
Director-Risk Management

Ryder System, Inc.
Miami, Florida
W. Michael McDonald
Group Director, Corporate Risk Management

Scovill Inc.
Farmington, Connecticut
Lloyd W. Taylor
Director, Risk Management

SKF USA Inc.
King of Prussia, Pennsylvania
Brian J. Duffy
Corporate Risk Manager

Square D Company
Palatine, Illinois
Gary K. Cubbison
Corporate Director of Risk Management

Sundstrand Corporation
Rockford, Illinois
J. Larry Griffin
Director, Risk Management and Loss Control

Teledyne, Inc.
Los Angeles, California
Stanford V. Smalley
Controller, Finance & Administration

Textron Inc.
Providence, Rhode Island
Peter B. Hoffmann
Director, Property and Casualty Insurance

Transamerica Corporation
San Francisco, California
Judith M. Tomese
Vice President-Risk Management

TRINOVA Corporation
Maumee, Ohio
William E. Rose
Director-Risk Insurance & Retirement Assets

TRW Inc.
Cleveland, Ohio
Adelbert H. Seiple, Jr.
Director, Risk Management

Unisys Corporation
Blue Bell, Pennsylvania
James G. McMullen
Director-Risk Management

USX Corporation
Pittsburgh, Pennsylvania
Bane Hereford
Director-Corporate Risk Management

Westinghouse Electric Corporation
Pittsburgh, Pennsylvania
Michael W. Bryant
Director, Property and Casualty Insurance

Woodward Governor Company
Rockford, Illinois
Edward F. Wood
Corporate Risk Manager

Zurn Industries, Inc.
Erie, Pennsylvania
James A. Zurn
Senior Vice President

Staff Director to the Council
Frederick T. Stocker
Counsel

MAPI RISK MANAGEMENT COUNCIL II

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Craig J. Mockler
Corporate Risk & Insurance Manager

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Charles L. Russell
Director, Risk Management

American Standard Inc.
New York, New York
Joseph A. Rinaldi
Director of Risk Management

AMSTED Industries Incorporated
Chicago, Illinois
Jerry D. Price
Assistant Treasurer

Apple Computer, Inc.
Cupertino, California
Sandra Koelzer
Risk Manager

APV Crepaco, Inc.
Rosemont, Illinois
A. Paul Lewis
Treasurer

AXIA Incorporated
Oak Brook, Illinois
Anna M. Raymond
Risk Manager

Bell & Howell Company
Skokie, Illinois
Bruce C. Wilson
Director Corporate Insurance

Berwind Corporation
Philadelphia, Pennsylvania
Martin Hahn
Director-Corporate Risk and Insurance

J I Case Company
Racine, Wisconsin
Dwight K. Horner
Manager of Corporate Insurance

CBI Industries, Inc.
Oak Brook, Illinois
Kathleen A. O'Malley
Director, Corporate Risk Management

Cincinnati Milacron, Inc.
Cincinnati, Ohio
Clemens A. Moenster
Director of Risk Management

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Windsor Locks, Connecticut
Dale J. Ribaudo
Assistant Treasurer

Dorr-Oliver Incorporated
Milford, Connecticut
Anthony J. Octavio
Assistant Treasurer

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Dallas, Texas
Linda G. Nabors
Director of Risk Management

Duchossois Industries, Inc.
Elmhurst, Illinois
Charles R. Fields
Risk Manager

E-Systems, Inc.
Dallas, Texas
David V. Roberts
Director of Insurance

FPL Group, Inc.
North Palm Beach, Florida
Richard E. Hinds
Risk Manager

General Signal Corporation
Stamford, Connecticut
James H. Doherty
Assistant Treasurer-Risk Management

Goulds Pumps, Inc.
Seneca Falls, New York
Gary E. Elkin
Corporate Risk Manager, CSP

Hillenbrand Industries, Inc.
Batesville, Indiana
Dennis R. Zwink
Director, Risk Management

Honeywell Inc.
Minneapolis, Minnesota
Thomas P. Seuntjens
Director, Corporate Risk and Employee Systems Management

IDEX Corporation
Northbrook, Illinois
Robert D. Grindel
Assistant Treasurer

Illinois Tool Works Inc.
Glenview, Illinois
Richard L. Schmidt
Risk Manager

IMC Fertilizer Group, Inc.
Mundelein, Illinois
Dennis E. Flynn
Director, Risk Management

Masco Corporation
Taylor, Michigan
Joseph A. Anastasio
Corporate Risk Manager

Mine Safety Appliances Company
Pittsburgh, Pennsylvania
William J. Berner
Risk Manager

NACCO Industries, Inc.
Dallas, Texas
Alfred K. Day, III
Manager, Employee Benefits and Risk Management
The North American Coal Corporation

National Semiconductor Corporation
Santa Clara, California
Eugene K. Kiernan
Director, Risk Management & Insurance

Norton Company
Worcester, Massachusetts
Brian D. Casey
Director, Risk Management

The Perkin-Elmer Corporation
Norwalk, Connecticut
Nicholas N. DeRosa
Director, Risk Management

Polaroid Corporation
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Warren G. Uhler
Director, Risk Management

Premark International, Inc.
Deerfield, Illinois
Geoffrey T. Smith
Director, Risk Management

Ralston Purina Company
St. Louis, Missouri
William E. Drum
Vice President, Director of Risk
Management

Raytheon Company
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Raymond M. Carberry
Assistant Treasurer, Risk
Management-Insurance

Reliance Electric Company
Cleveland, Ohio
Thomas F. Cipollone
Risk Manager

SPS Technologies, Inc.
Newtown, Pennsylvania
Robert A. Zeberlein
Manager, Insurance & Benefits

The Stanley Works
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John C. Calkins
Director, Risk and Insurance
Management

White Consolidated Industries, Inc.
Cleveland, Ohio
Gene H. Heskett
Director, Risk Management

Whitman Corporation
Chicago, Illinois
Geraldine K. Marquart
Assistant Vice President
Risk Management

Wyle Laboratories
El Segundo, California
Donald J. Cwik
Director of Insurance and Risk
Management

Staff Director to the Council
Frederick T. Stocker
Counsel

MAPI TAX COUNCILS

Purpose

Senior corporate tax executives have multiple roles. As managers, they administer corporate functions. As expert tax practitioners, they are responsible for company compliance with tax rules and company response to ever-changing tax laws and regulations in the United States and abroad. As advisors, they bring to the corporate planning process knowledge of both tax rules and the overall operations of their companies.

The MAPI Tax Council program is designed and operates to assist tax executives in performing their multiple roles by providing formal and informal forums for the exchange of knowledge and experience. The principal purposes of MAPI Tax Councils I and II may be summarized as follows:

1. To facilitate the sharing of expertise concerning the overall operating environment of the tax executive, including all major aspects of policy, planning, compliance, audit management, and administration.

2. To bring the skills and experience of senior tax executives to bear on policy issues in areas such as the taxation of international operations, tax aspects of corporate reorganization, research and investment incentives, and employee benefit programs.

3. To assist tax executives in increasing their knowledge and understanding of the tax laws and planning techniques both in the United States and in foreign jurisdictions.

4. To offer assistance to the MAPI staff in its policy development and government relations programs in the tax area.

Program

Like all MAPI councils, the two Tax Councils meet twice a year for programs featuring prepared presentations by Council members and, on a selective basis, by representatives of the legislative and executive branches of the federal government, and for roundtable discussion of issues of common concern. Over the last year, the Councils have considered such subjects as:

— Options for Reforming U.S. International Tax Policy
— The Section 482 "White Paper" on Intercompany Transfer Pricing
— The Organization and Structure of the Tax Function
— FAS 96: Implementation Procedures and Issues
— Cycle Time Audit Management
— The Commissioner's Study of Civil Tax Penalties
— The Foreign Tax Credit
— The Spreading Package Design Costs Capitalization Issue
— Responding to Europe "1992"
— The Research Credit

MAPI's Tax Council meetings are registered with continuing legal and accounting education programs in several states.

A further important facet of the MAPI Tax Council program is the "networking" by member tax executives that is encouraged and facilitated both through the formal meeting program and informal contacts throughout the year. Council members frequently call upon each other for information and assistance in meeting tax management challenges.

MAPI TAX COUNCIL I

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Vice Chairman

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Robert A. Stevenson
Consultant-Federal Taxes

Acme Steel Company
Riverdale, Illinois
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Assistant Treasurer-Taxation

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Stephen K. Deay
Director-Taxes

Aluminum Company of America
Pittsburgh, Pennsylvania
Donald A. Schratz
Director-Taxes

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New York, New York
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Middletown, Ohio
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Morristown, New Jersey
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Tax Director-Federal Tax
Consolidation & Methods

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Fullerton, California
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Bethlehem, Pennsylvania
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Director, Tax Planning & Appeals

Blount, Inc.
Montgomery, Alabama
Robert H. Fries
Director of Taxes

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Director of Taxation

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Peoria, Illinois
Robin D. Beran
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Julius Levinson
Vice President-Taxes

Connell Limited Partnership
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Director of Taxes

Control Data Corporation
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Real Estate

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Director of Taxes

Dana Corporation
Toledo, Ohio
Charles W. Hinde
Director Corporate Accounting and
Taxes

Deere & Company
Moline, Illinois
Thomas K. Jarrett
Director of Taxes

Digital Equipment Corporation
Acton, Massachusetts
Joseph W. Tierney
Director of Taxation

Dresser Industries, Inc.
Dallas, Texas
David R. Smith
Director-Taxes

E. I. du Pont de Nemours and Company
Wilmington, Delaware
Richard A. Sherry
Manager Federal &
International Taxes

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Director of Taxes

Eaton Corporation
Cleveland, Ohio
Joseph J. Mikelonis
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St. Paul, Minnesota
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Vice President-Tax

The Fairchild Corporation
Chantilly, Virginia
John L. Flynn
Vice President, Taxes

Federal-Mogul Corporation
Detroit, Michigan
Robert C. Rozycki
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International Taxes

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Vice President-Tax

FMC Corporation
Chicago, Illinois
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Vice President, Tax

Ford Motor Company
Dearborn, Michigan
Murray Schlussel
Assistant General Counsel

The Foxboro Company
Foxboro, Massachusetts
Bruce W. Larson
Manager of Tax Planning

FPL Group, Inc.
North Palm Beach, Florida
Gabriel M. Konecsny
Assistant Treasurer and
Director of Taxes

GATX Corporation
Chicago, Illinois
Alan Rusin
Director of Taxes

General Motors Corporation
Detroit, Michigan
James R. Mogle
Chief Tax Officer

General Signal Corporation
Stamford, Connecticut
Erwin Kantor
Vice President-Taxes

The Gillette Company
Boston, Massachusetts
Robert F. Sama
Vice President and Tax Counsel

GTE Corporation
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Tax Director

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Milwaukee, Wisconsin
Gary E. Lakritz
Director of Taxes

Hewlett-Packard Company
Palo Alto, California
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Fred Wojtowicz
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Assistant Treasurer-Taxes

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Director of Taxes

Johnson Controls, Inc.
Milwaukee, Wisconsin
Franklin H. Smith, Jr.
Director, Corporate Taxes

Kennametal Inc.
Latrobe, Pennsylvania
Richard P. Gibson
Assistant Treasurer &
Director of Taxes

Litton Industries, Inc.
Beverly Hills, California
Dro Amirian
Director of Taxes

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M. D. Menssen
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Tulsa, Oklahoma
Austin J. Greene
Vice President & Tax Counsel

Martin Marietta Corporation
Bethesda, Maryland
Arnold Chiet
Vice President and
General Tax Counsel

McDonnell Douglas Corporation
Hazelwood, Missouri
Robert A. Martin
Tax Officer

Milliken & Company
Spartanburg, South Carolina
Lawrence Heagney
Vice President, Secretary &
Treasurer

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Tax Director

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Transportation Corp.**
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Vice President

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Deerfield, Illinois
James E. Rose, Jr.
Vice President, Taxes

Ralston Purina Company
St. Louis, Missouri
Ronald B. Weinel
Vice President-Taxes

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Rockford, Illinois
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Gregory E. Hudson
Vice President, Taxes

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Director of Tax Audits and
Special Projects

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Philip F. McGovern
Director of Taxes

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Blue Bell, Pennsylvania
Jack R. Silverberg
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United Technologies Corporation
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Kevin G. Conway
Director of Taxes

USX Corporation
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Ralph J. Denney
Director of Taxes

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Vice President and General Counsel

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Douglas W. Gutow
Vice President Taxation

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Pittsburgh, Pennsylvania
Michael W. Huber
Associate General Tax Counsel

Staff Director to the Council
Tracy Hollingsworth Jones
Attorney

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Vice Chairman

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Houston, Texas
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Columbus, Indiana
Vincent J. Akers
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John B. Lockwood
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Dallas, Texas
Steve W. Scarbrough
Tax Director

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St. Louis, Missouri
H. John Yopp
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Director of Taxes

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William L. Schweitzer
Director-Taxation

Ferranti International, Inc.
Lancaster, Pennsylvania
Judith F. Maskrey
Director of Taxation

Figgie International, Inc.
Willoughby, Ohio
William R. Hoelting
Manager-Corporate Tax

Fisher Controls International, Inc.
St. Louis, Missouri
D. James Tiburzi
Director, Tax

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Fairlawn, Ohio
Wayne Robinson
Director of Taxes

Gould Inc.
Eastlake, Ohio
John L. Monaco
Vice President-Tax & Treasurer

Goulds Pumps, Inc.
Seneca Falls, New York
Glenn D. Huels
Corporate Tax Manager

Greyhound Dial Corporation
Phoenix, Arizona
William J. Hallinan
Vice President-Taxes & Associate
General Counsel

Grumman Corporation
Bethpage, New York
Douglas A. Dahlgard
Director of Taxes

Guardian Industries Corp.
Northville, Michigan
Paul M. Rappaport
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H. J. Heinz Company
Pittsburgh, Pennsylvania
Clyde E. Fearer
Director-Corporate Tax
Administration

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Oklahoma City, Oklahoma
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Director of Taxes

Harris Corporation
Melbourne, Florida
David S. Wasserman
Vice President-Taxes

Harsco Corporation
Camp Hill, Pennsylvania
Warren A. Weisel
Vice President-Taxes

Hillenbrand Industries, Inc.
Batesville, Indiana
James D. Van De Velde
Director, Taxes

The Hillman Company
Pittsburgh, Pennsylvania
Bruce I. Crocker
Vice President-Taxes

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Los Angeles, California
John J. Brown
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IBM Corporation
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Kenneth S. Pilipshen
Director of International Taxes

IDEX Corporation
Northbrook, Illinois
Stephen C. Davis
Director of Taxes

Illinois Tool Works Inc.
Glenview, Illinois
Robert V. McGrath
Director of Taxes

Intel Corporation
Santa Clara, California
Robert H. Perlman
Vice President, Tax, Licensing &
Customs

Axel Johnson Inc.
New York, New York
John C. Pascale
Director-Tax

Ketema, Inc.
Bensalem, Pennsylvania
William Yuschak
Treasurer

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Calabasas, California
Robert L. Mantle
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Taylor, Michigan
David A. Doran
Vice President-Taxes

Merck & Co., Inc.
Rahway, New Jersey
Patrick J. Moran
Vice President-Fiscal Legislation

Mine Safety Appliances Company
Pittsburgh, Pennsylvania
John M. Sutherland
Manager, Tax Department

MIPS Computer Systems, Inc.
Sunnyvale, California
Dean C. Wohlwend
Director, Customs & Tax

Motorola Inc.
Schaumburg, Illinois
Ray A. Dybala
Vice President and
Director of Taxes

Northern Telecom Inc.
Nashville, Tennessee
Robert L. Ashby
Assistant Vice President-Taxes

Northrop Corporation
Los Angeles, California
Richard B. Waugh, Jr.
Vice President-Taxes, Risk
Management and Business Analysis

Owens-Corning Fiberglas Corporation
Toledo, Ohio
William F. Dent
Assistant Secretary/Director
of Taxes

Parker Hannifin Corporation
Cleveland, Ohio
Joseph B. Dorn
Vice President-Taxation

Peabody Holding Company, Inc.
St. Louis, Missouri
Gregory L. Thebeau
Director, Taxes

Pechiney Corporation
Greenwich, Connecticut
Thomas J. Buckley
Director of Taxes

The Perkin-Elmer Corporation
Norwalk, Connecticut
John J. Ryan
Director, Corporate Taxes

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Stamford, Connecticut
Allan A. Crystal
Vice President-Corporate Taxes

PPG Industries, Inc.
Pittsburgh, Pennsylvania
Edward I. Sproull, Jr.
Vice President, Tax Administration

Raychem Corporation
Menlo Park, California
Lisa Lindberg
Director of Taxes

Reliance Electric Company
Cleveland, Ohio
Kent G. Coppins
General Tax Counsel

Robertson Ceco Corporation
Pittsburgh, Pennsylvania
William E. Macfarlane
Assistant Treasurer and Tax
Manager

Rohr Industries, Inc.
Chula Vista, California
Helen R. Bryant
Director of Taxes

Milton Roy Company
St. Petersburg, Florida
Keith R. Brockman
Corporate Tax Manager

The Stanley Works
New Britain, Connecticut
John P. Callahan
Vice President, Taxes

Tektronix, Inc.
Beaverton, Oregon
Richard Burgoine
Corporate Tax Director

Tenneco, Inc.
Houston, Texas
J. Randall Biser
Director, Tax Legal

Texas Instruments Incorporated
Dallas, Texas
William B. Blaylock
Manager, Federal Taxes

TRINOVA Corporation
Maumee, Ohio
Philip G. Simonds
Vice President-Taxation

TRW Inc.
Cleveland, Ohio
William A. Warren
Vice President

Tyco Laboratories, Inc.
Exeter, New Hampshire
Alan D. Gibbons
Assistant Director of Taxes

United Technologies Corporation
Hartford, Connecticut
Robert W. Romeo
Director, Domestic Taxes

Whitman Corporation
Chicago, Illinois
John F. Palmer
Vice President-Taxes

Xerox Corporation
Stamford, Connecticut
Thomas P. Maletta
Vice President-Tax

Staff Director to the Council
Tracy Hollingsworth Jones
Attorney

MAPI CONFERENCE ON BUSINESS AND ECONOMIC POLICIES

Purpose

The annual MAPI Conference on Business and Economic Policies, a unique program in business education, has been one of MAPI's most effective and rewarding activities. The Conference has a long tradition of providing business executives with a forum for analyzing crucial questions concerning international competitiveness; productivity; quality; personnel development, education, and training; global procurement; strategic planning; and cost effectiveness. An area of equal importance and, at least at the moment, less susceptible to scientific analysis, is that of problems concerning the national interest. Here the need for broad-minded business leaders—familiar with national problems affecting industry and capable of statesman-like judgment on public policy considerations—is paramount. The guest speakers appearing at the 1989-90 Conference are shown on the following page.

The seminar-like Conference, which was first organized in 1945-46, is directed toward the following objectives:

1. To generate fuller understanding of the problems and opportunities now facing manufacturers in the U.S. industrial sector;

2. To give executives a deeper awareness of broad public problems and a fuller appreciation of the impact of public policy in their industries;

3. To explore innovative and economically sound means of achieving increased investment and higher productivity in manufacturing; and

4. To broaden the knowledge of participants and provide them with opportunities to discuss and debate issues with executives from a wide range of industries.

Generally, MAPI endeavors to rotate invitations to the Conference among the MAPI membership, although a growing number of companies utilize the Conference series each year as an integral part of their training programs for young executives. Forty-three Conferences have been organized since 1945, and the 44th will be conducted in 1991-1992. The alumni of the Conference number over 2,500 executives from a broad cross-section of U.S. industry.

Organization of the Conference Group

Each year an entirely new Conference group is organized in order to spread the benefits among the membership. The group is limited in number; company participation is by invitation, with attendance limited to enrolled members of the Conference.

Each Conference consists of an annual series of four seminar-like meetings, chaired by Robert H. Aten, Vice President and Chief Economist, with the assistance of Jerry J. Shipley and Patricia Buckley, economists, beginning in the fall and continuing through the spring. Each session features several guest speakers selected on the basis of their outstanding contributions to industry, government, or academe. Normally, the first and last meetings of the series are three-day sessions (Thursday through Saturday). The intermediate meetings consist of two-day sessions.

42ND MAPI CONFERENCE ON BUSINESS AND ECONOMIC POLICIES

Guest Speakers, 1989-90

Darryl F. Allen
President and
Chief Executive Officer
TRINOVA Corporation

Anne E. Brunsdale
Chairman
U.S. International Trade
Commission

E. Scott Dalton
Vice President, Employee and
Community Relations
Reliance Electric Company

Paul R. Daoust
Vice President and Manager
The Wyatt Company

Edward W. Kelley, Jr.
Member
Board of Governors of the
Federal Reserve System

James E. Marley
President
AMP Incorporated

John M. Nelson
Chairman and
Chief Executive Officer
Norton Company

Ronald A. Pearlman
Chief of Staff
Joint Committee on Taxation
United States Congress

Frederick Ribe
Assistant Director for Fiscal Analysis
Congressional Budget Office

Robert G. Ripston
Vice President-Human Resources
Ingersoll-Rand Company

Ralph Z. Sorenson
Adjunct Professor of Management
Harvard Business School
Harvard University

Harry C. Stonecipher
President and
Chief Executive Officer
Sundstrand Corporation

Alan J. Streb
Deputy Assistant Secretary for
Conservation
U.S. Department of Energy

Andrew C. Szakmary
Senior Economist
McDermott International, Inc.

Richard F. Teerlink
President and
Chief Executive Officer
Harley-Davidson, Inc.

Gerald T. Underwood
Director, Office of Metric Programs
U.S. Department of Commerce

R. William Van Sant
President and
Chief Operating Officer
Blount, Inc.

W. R. Werner
Director-Corporate Purchasing
Emhart/Black & Decker

John G. Wilkins
Senior Advisor for Economics to the
Assistant Secretary for Tax Policy
U.S. Department of the Treasury

Bruce Yandle
Alumni Distinguished Professor
of Economics
Clemson University

43RD MAPI CONFERENCE ON BUSINESS AND ECONOMIC POLICIES

Allegheny Ludlum Corporation
Claremore, Oklahoma
William G. Bieber
General Manager
Tubular Products Division

Allen-Bradley Company
Highland Heights, Ohio
Richard C. Ryan
Vice President, Control Systems
Industrial Computer and
Communication Group

Manchester, New Hampshire
Nicholas P. Fowler
Director, Production and Director,
Materials Management
Presence Sensing Products Division

Amerace Corporation
Brooksville, Florida
David Schultz
President
MIPCO

American Meter Company
Philadelphia, Pennsylvania
Andrew Watson
Vice President, Finance and
Treasurer

AMP Incorporated
Harrisburg, Pennsylvania
William R. Charron
General Manager
Interconnection Components and
Assemblies Products Group (IC&A)

Richard H. Kaleida
Director of Procurement
and Transportation
Operations and
General Services Division

Arvin Industries, Inc.
Columbus, Indiana
Rex L. Emshwiller
Assistant Controller

AXIA Incorporated
Oak Brook, Illinois
Lyle J. Feye
Controller and Assistant Treasurer

Blount, Inc.
Portland, Oregon
Noel G. Hingley
Vice President, Manufacturing
Oregon Cutting Systems

Blue Bird Body Company
Fort Valley, Georgia
James H. Grantham
Vice President-Materials

The Boeing Company
Seattle, Washington
John R. Kegley
Deputy Corporate Director-Issues
Management

Cincinnati Incorporated
Cincinnati, Ohio
Marilyn H. Bourquein
Manager
Management Information Systems

Cincinnati Milacron, Inc.
Batavia, Ohio
Harold J. Faig
Vice President-General Manager
Plastic Injection Machinery Business

Clark Components International
Statesville, North Carolina
Raemond F. German
Vice President and Executive
Engineer-Worldwide

Commercial Intertech Corp.
Youngstown, Ohio
John Gilchrist
Vice President-General Manager
Hydraulic Pump Division

George B. Miller, Jr.
General Manager
Youngstown Stamping Division

Cooper Industries, Inc.
Raleigh, North Carolina
R. Frank DuBose
Vice President, Operations
Cooper Hand Tools Division

Quincy, Illinois
J. Dennis Shull
Director of Marketing
Industrial Machinery Division

Dresser Industries, Inc.
Houston, Texas
Eddie A. Svinky
Manager of Operations
Dresser Manufacturing Division

Dresser-Rand Company
Olean, New York
Norman L. Moore
Director, Human Resources
Turbo Products Division

Minneapolis, Minnesota
Arthur R. Titus
Manager, Marketing and Sales
Electric Machinery Division

Eaton Corporation
Kalamazoo, Michigan
Timothy Morscheck
Manager, On/Off Highway
Specialty Products Group
Truck Components Operations-
North America

Eimco Process Equipment Company
Salt Lake City, Utah
Hans E. Vanden Noort
Vice President-Finance and
Administration

Ellicott Machine Corporation
Baltimore, Maryland
Charles R. Kreter
Chief Financial Officer

The Falk Corporation
Milwaukee, Wisconsin
Terry L. Ball
Director of Sales and Marketing

Farrel Corporation
Ansonia, Connecticut
Robert M. Bain
Vice President, Sales

Federal-Mogul Corporation
Detroit, Michigan
Stephen J. Hauser
Director-Corporate Development

Gary J. Lehman
Director of Marketing
Worldwide Aftermarket Operation

FMC Corporation
Jonesboro, Arkansas
Rick A. Beets
Manager
Agricultural Machinery Division

General Electric Company
Dallas, Texas
John M. Harrell
Corporate Area Manager-Southwest
Marketing & Sales Division

Giddings & Lewis, Inc.
Fond du Lac, Wisconsin
Stephen M. Peterson
Vice President-Sales

Glitsch International, Inc.
Parsippany, New Jersey
Clyde C. Copeland
President and
Chief Executive Officer
Otto H. York Company, Inc.

Dallas, Texas
R. W. Hill
President
Glitsch, Inc.

Hagglunds Denison Corporation
Delaware, Ohio
Michael Hadfield
Vice President and General Manager
Marketing Division

Harley-Davidson, Inc.
Wakarusa, Indiana
Joseph DiBiagio
Senior Vice President-Manufacturing
Holiday Rambler Corporation

Harris Corporation
Melbourne, Florida
R. E. Sullivan
Senior Vice President-Administration

Harsco Corporation
Highland, Indiana
Kenneth C. Anderson
President
Reed Minerals Division

Hercules Aerospace Company
Vergennes, Vermont
Salvatore V. Ronchetti
Vice President, Engineering
and Operations
Simmonds Precision Aircraft
Systems Division

Hewlett-Packard Company
Atlanta, Georgia
John H. Salyer
General Manager
Southern Sales Region

IBM Corporation
Purchase, New York
Philip S. Thompson
Director, CIM Integration
IBM United States

IDEX Corporation
Denver, Colorado
Roger N. Egan
Vice President-Marketing
Band-It

Buffalo, New York
Ralph Yorio
Vice President-Engineering
Vibratech, Inc.

Illinois Tool Works Inc.
Glenview, Illinois
John A. Mayfield
Vice President-Group Controller
Signode Packaging Systems

Imo Industries Inc.
Lawrenceville, New Jersey
Frederick W. Wojtowicz
Executive Tax Director

Ingersoll-Rand Company
Davidson, North Carolina
S. Peter Baldwin
Vice President, Sales and Service
Air Compressor Group

The Ingersoll Milling Machine Company
Troy, Michigan
Wayne B. Kidder
Vice President, Automotive Sales

Inland Steel Industries, Inc.
Chicago, Illinois
Ludwig A. Streck
Controller

Kennametal Inc.
Raleigh, North Carolina
P. Mark Schiller
Director-Distribution Services
Metalworking Systems

Kranco, Inc.
Houston, Texas
Robert J. Kroll
Product General Manager
Material Handling and
Equipment Division

Lear Seating Corporation
Southfield, Michigan
Arthur H. Vartanian
Business Manager

Lucas Western Inc.
Jamestown, North Dakota
David A. Hammond
Director of Material
Flight Structures Division

The Manitowoc Company, Inc.
Manitowoc, Wisconsin
William W. Fox
Executive Vice President and
General Manager
Manitowoc Engineering Co.

McDermott International, Inc.
New Orleans, Louisiana
Robert A. Jolliff
Treasurer

Morgan City, Louisiana
Gary W. Drinkwater
Vice President & General Manager,
Domestic Operations
Marine Construction Division
McDermott Incorporated

Mosler Inc.
Hamilton, Ohio
Nicholas L. Maus
Director, Hamilton/Milford
Operations
Physical Security Division

Navistar International Transportation Corp.
Springfield, Ohio
Dale E. Snyder
Vice President, Manufacturing
Truck Operations

Parker Hannifin Corporation
Cleveland, Ohio
Thomas A. Piraino, Jr.
Vice President-Law

Parkson Corporation
Ft. Lauderdale, Florida
Charles R. Morgan
Senior Product Manager

Petrolite Corporation
Houston, Texas
Richard J. Seidel
Vice President & General Manager
Equipment & Instruments Group

Reliance Electric Company
Cleveland, Ohio
Robert L. Matejka
Director, Accounting & Control

Greenville, South Carolina
E. C. Orfanedes
Manager, International Operations
and Sales
Mechanical Group

Rexnord Corporation
Milwaukee, Wisconsin
Peter C. Wallace
Vice President-Marketing

Rockford Products Corporation
Rockford, Illinois
Michael S. Harrison
Director of Operations

Milton Roy Company
Acton, Massachusetts
Douglas J. Bingler
Vice President and General Manager
Liquid Metronics Division

Siemens Energy & Automation, Inc.
Atlanta, Georgia
Alan R. Saunders
Atlanta Area Sales Manager

A. O. Smith Corporation
Little Rock, Arkansas
William V. Waters
President
Smith Fiberglas Products Inc.

SPX Corporation
Muskegon, Michigan
Kenneth C. Dow
Director-Financial Control and
Planning

Sundstrand Corporation
Rockford, Illinois
DeWayne J. Fellows
Vice President and Controller

Edwin W. Laprade
Director-Manufacturing
Advanced Technology Group

David J. Linton
Program Manager-Actuation and
Secondary Power
Advanced Technology Group

Suntec Industries Incorporated
Rockford, Illinois
David P. Bippus
Vice President of Operations

Sweco, Inc.
Florence, Kentucky
Warren H. Griffith
Vice President-Operations

The Torrington Company
Torrington, Connecticut
Michael L. Hurt
General Manager
Precision Components Division

United Dominion Industries
Charlotte, North Carolina
Thomas J. Snyder
Assistant Treasurer

USX Corporation
Pittsburgh, Pennsylvania
Larry G. Schultz
Director, Analysis &
General Accounting
USS Division

Vickers, Incorporated
Troy, Michigan
John T. Hutterly
Vice President-Global Sales
Commercial Fluid Power

Searcy, Arkansas
Alan Clark
Vice President-Controls

Westinghouse Electric Corporation
Orlando, Florida
Patrick T. Conroy
General Manager
Power Generation Service Division

Woodward Governor Company
Rockford, Illinois
Stephen P. Carter
Manager of Accounting Systems
and Financial Reporting

Fort Collins, Colorado
Terry A. Shetler
General Manager
Turbomachinery Controls

Conference Chairman
Robert H. Aten
Vice President and Chief Economist

MAPI GENERAL CONFERENCES

The Alliance schedules and conducts general conferences each year. These conferences are devoted to basic management problems as well as to key public issues and problems of government-industry relations. In 1990 MAPI held three conferences—its fifth annual government contracts conference, "The Current Environment in Government Procurement"; a conference on "New Trends in Employee Benefits"; and a Tax Conference entitled, "Tax Management on a Global Scale: Meeting the Challenges of a World Economy." Other recent conferences include: Environmental Regulatory and Management Issues for U.S. Manufacturing Companies; Employment Law and Human Resources Developments; New Trends in Accounting and Financial Reporting; Health Care Cost Containment; Foreign Trade; Federal Tax Policy; Workers' Compensation; Private and Public Pension Plans; Products Liability; Directors' and Officers' Liability; Occupational Safety and Health; and Equal Employment Opportunity.

MAPI PUBLICATIONS

Since its founding in 1933, MAPI has pursued an active and vigorous publications program. Early on, MAPI identified the great issues that we felt needed to be addressed in a publication entitled *Conditions of a Dynamic Society.* The first issue concerned how our economy can achieve and preserve the maximum rate of technical progress. The second was how to reduce cyclical fluctuations in production, employment, and national income. Finally, the third of the great issues was how to develop a high level of exports of American capital goods. We concluded by noting that . . .

> How we cope with these great issues now and in the years ahead will determine our success in raising living standards and in working with the free peoples of the world for the protection of individual initiative and for the stimulation of self-reliance and economic progress. These objectives are rooted in private saving and investment and not in extortionate taxation and public spending with the loss of individual liberties inherent in such a way of life.

Almost 60 years later, our program is still attuned to the great issues that we consider to be of vital importance to U.S. industry and to the economy as a whole. For the last several years, we have been addressing, in many of our publications, U.S. industry's role in a global economy and policies designed to increase the ability of U.S. manufacturing businesses to retain or restore their leadership position in domestic and international markets. For example, in a November 1990 policy review entitled, *Why U.S. Manufacturers Are at a Competitive Disadvantage,* we examined in an Overview the challenges faced by U.S. industry from foreign competition as well as the deficiencies which currently exist in U.S. policies toward capital investment. We laid particular stress on the problem of insufficient capital investment, and concluded by observing that this problem . . .

> cannot be resolved without some initial sacrifice by all groups in society. It may be that no interest group is willing to make those sacrifices, and perhaps politicians are unwilling to advocate policies that involve reducing current consumption. If that is the case, future generations of Americans will be unable to enjoy the economic and political benefits of a manufacturing sector which for almost half a century was second to none in world markets.

In its publications, MAPI has built its reputation on thorough research, careful attention to detail, accurate analysis of facts and issues of concern to business generally and to our member companies specifically, and on our comprehensive and timely information service. Getting vital information quickly to MAPI member company executives and to public officials and helping to shape public policies are at the core of the MAPI publications program. We are as committed to this course of action now as we were when this organization was founded.

In 1990, MAPI published more than a hundred studies, reports, and announcements. In addition to three books which were issued in 1990, the basic format of our publications program consists of Policy Reviews, Economic Reports, Legal Analysis and Regulations, Executive Letters, and Announcements. These various series are described below with the exception of the Announcements, which need no further mention except to observe that they are used to notify members of forthcoming MAPI conferences and books and other MAPI publications.

Books

In 1990 MAPI published three books. They are discussed briefly below.

Environmental Regulatory and Management Issues for U.S. Manufacturing Companies. March 1990.

This book addresses two areas of primary concern to environmental managers. First, it provides comprehensive updates concerning key legal and regulatory developments and trends affecting U.S. manufacturers. Included in the book are chapters on developments affecting the regulation of hazardous waste, "community right-to-know" requirements, and the enforcement of environmental laws. Second, the book has practical information on developing effective environmental programs based on the expertise of environmental managers from leading-edge manufacturing companies and other environmental professionals.

Government Procurement Issues for the 1990s—The Fifth MAPI Conference. June 1990.

This book is comprised of selected presentations given at the MAPI conference by highly qualified experts from government, industry, and the legal and accounting professions who presented their views on the most pressing and significant issues in government procurement. As this year's MAPI conference speakers observed, many of the 1980s issues concerning the relations between contractors and the government will continue on the procurement policy agenda in the 1990s, but new issues also will emerge. As the book notes, it will be even more incumbent upon the government contracting community to anticipate these issues, look for opportunities to improve the procurement process, and take advantage of the implications of changing world events.

New Trends in Employee Benefits. November 1990.

This book provides practical information on the design and administration both of conventional benefits and nontraditional ones that are evolving to meet changing work force needs. Changing work force needs include: the higher proportion of women and minorities in the work force; more dual-income couples and their need for dependent care; growing incidence of substance abuse that is driving the need for rehabilitation programs; disabled persons with contributions to make but without commensurate opportunity; and the shortage of skilled workers.

Chapters in the book deal with retirement income—the trend toward defined contribution plans and annuitization versus lump-sum payout; health care cost containment; employee and retiree medical care programs; the Pepper Commission recommendations; demographics and early retirement; flexible benefits; the controversy over accrual accounting for retiree health and other nonpension, post-employment benefits; and a look into the future of benefit planning and the cost implications.

Policy Reviews

Policy Reviews represent our flagship publication, and we publish only a limited number each year. These reviews generally take one important aspect of a current public policy issue, analyze that issue from several perspectives but primarily from an industry perspective, and then offer our recommendations for change and improvement. Fourteen policy reviews have been published since this service was inaugurated almost three years ago. In the past, we have discussed and analyzed tax and spending policy for the 1990s, the crisis in the health care system, environmental policy for the coming decade, progress and prospects for U.S. manufacturing, the status of products liability in the United States, third-world debt, employer pension plans, government procurement problems, saving and investment, and strengthening the organizational framework for U.S. trade and other international economic policies. These policy reviews are distributed widely to officials in the Administration, members of Congress and their staffs, other research and policy institutes, and academicians with the expectation that they will generate and contribute to serious discussions of these issues. The four policy reviews published in 1990 are described briefly below.

Importance of New Initiatives for Joint R&D and Manufacturing for U.S. Competitiveness. Policy Review 111.

U.S. firms increasingly are turning to cooperative ventures to improve their competitiveness in global markets. Since U.S. antitrust laws were amended in 1984 to encourage joint research partnerships between U.S. firms, more than 100 research consortia have registered with the U.S. Department of Commerce. Now that some companies are considering expanding the use of partnership arrangements for the development, manufacture, and marketing of their products, a debate is under way not only about what type of joint arrangements should be encouraged and supported by the federal government, but also about the potential effects of production consortia on the U.S. entrepreneurial system.

This policy review looks first at the rationale for increased cooperation among firms and then discusses suggested changes in antitrust laws to assist cooperative manufacturing and some proposals by the federal government concerning increases in direct government support for joint research and development (R&D) ventures. The policy review calls for a major increase in government funding, with matching contributions from the private sector, for joint research ventures such as SEMATECH and similar government-business partnerships structured to ensure that the outcomes of research will be distributed throughout industry. According to the MAPI policy review: "Technological change is so important to our economic vitality that, if we err, we should be certain to err on the side of innovation."

The Saving Factor: Relative vs. Absolute Measures. Policy Review 112.

Having advocated a higher level of saving and investment in an earlier Policy Review entitled *The Saving Factor: "Too Much" or "Too Little?"* (PR-109), MAPI, in this policy review, examines the impact of national income on saving, rather than the effect of saving on national income, and the amount of saving (an absolute measure) as contrasted with the rate of saving (a relative measure). It then turns to the question of whether the ultimate problem is one of investment rather than of saving. In the process, some traditional measures of the adequacy of savings are examined before an alternative measure is introduced, that is, looking at gross saving, gross private saving, and personal saving in absolute terms.

The Impact of the Federal Budget on American Business. Policy Review 113.

This policy review analyzes the deficit reduction package agreed upon by Congress and the Administration prior to the November 1990 elections. After summarizing the deficit reduction package, MAPI offers its criticisms in detail of the budget agreement, outlines the importance of the federal budget to the vitality of U.S. industry, and explains why the promised deficit reduction of $496 billion over the next five fiscal years will be difficult to achieve ". . . without adopting additional, painful deficit reduction legislation in future years."

The chief shortcomings of the deficit reduction package, as noted by MAPI, include: too heavy reliance on taxes and far too little on domestic outlay reductions in mandatory programs, such as Medicare; spending for domestic discretionary programs is raised too much; it is based on unrealistic economic assumptions, particularly in the "out" years; intricate tax provisions were included at the last moment without hearings or significant debate; changes in the Gramm-Rudman-Hollings deficit targets mean there will be less incentive in the future to make additional deficit reductions; and, it does not come close to resolving the basic problem of the structural budget deficit.

Why U.S. Manufacturers Are at a Competitive Disadvantage: A Comparison of the Cost of Capital, Investment, and Productivity in the United States and Japan. Policy Review 114.

Differences in productivity performance in U.S. and Japanese manufacturing are examined in this policy review. A major finding is that Japanese manufacturing companies have consistently enjoyed much lower costs of capital than their U.S. competitors. There are two key sources of this differential in favor of Japan: the availability of a large source of funds from employee savings programs; and access to low-cost capital from Japanese banks which own a substantial share, on average about 85 percent, of the liabilities in manufacturing companies.

The policy review demonstrates the link between capital investment and industrial productivity growth and analyzes the sources of the gap in both factors between the United States and Japan since 1965. Although the Japanese economy is only two-thirds the size of the U.S. economy, in 1988, Japan's gross fixed capital investment was $881.9 billion compared to $839 billion in the United States. On a per capita basis, Japan's gross investment is about twice the rate of U.S. investment. Among the factors affecting the cost of capital and rates of investment discussed in the report are: a U.S. fiscal-monetary policy mix that has done little to encourage long-term capital investment or strengthen the competitive position of U.S. industry; a huge and growing U.S. federal deficit that crowds out other, more productive, uses of available money; burgeoning entitlement expenditures whose costs fall disproportionately on the U.S. working population, resulting in real average hourly wages falling to the level they were 25 years ago; the uncertainty and instability of the U.S. tax code (compared to Japanese tax policy) which have tended to discourage long-term U.S. investment in industrial plant and equipment; the ability of Japanese firms to write off a higher proportion of their costs of plant and equipment as depreciation expenses; elimination of the investment tax credit by the Tax Reform Act of 1986; strong tax incentives in Japan to encourage personal saving; ownership of Japanese corporate debt and equity by banks; the vertical integration of the Japanese industrial structure which allows corporations to finance modernization and innovation in one business with profits from another; and the ability of Japanese firms to recover more quickly R&D and early manufacturing costs by selling in their protected domestic market.

Among other recommendations, MAPI suggests that reducing the U.S. cost of capital significantly would require a nearly balanced federal budget to reduce capital inflows and put downward pressure on domestic interest rates. Saving must be encouraged by more favorable tax treatment, including changes in depreciation allowances and restoration of the investment tax credit for industry and a variety of incentives for personal saving. In addition, the federal government should increase its role in spurring basic research and offering incentives for diffusion of new technology and innovation.

Economic Reports

On a timely basis, MAPI alerts its member company executives to economic trends and policy through its series of Economic Reports. Last year, MAPI published more than 40 economic reports. Included in the Economic Reports series are the popular "Selected Economic Indicators," "The Employment Cost Index," and "Plant and Equipment Spending." Three of the most requested publications in 1990 were the *MAPI Survey on Outside Audit Fees: 1990* (ER-187), *Are You Ready for Disaster? A Corporate Guide for Preparedness and Response* (ER-170),and *The Drug-Free Workplace—A Progress Report 1990* (ER-164). Below is a list of other major Economic Reports published in 1990.

- *Reforming the Clean Air Act: Are There Lower Cost Solutions?*, ER-167
- *Foreign Investment in the U.S. Economy*, ER-163
- *U.S. Trade With Japan and the NICs: Past Performance and Future Prospects*, ER-157
- *Infrastructure Finance: A Problem for the 1990s*, ER-183
- *Manufacturing Employment: A Look Ahead to the Year 2000*, ER-180
- *The Gap in Compensation Costs Among Industries and Countries, 1989*, ER-195
- *Implications of Iraqi Invasion of Kuwait for U.S. Industry*, ER-189
- *MAPI Survey on U.S. Trade: Performance and Potential—A Self Portrait*, ER-182
- *Public Policies, Priorities, and Paradoxes*, ER-175

Legal Analysis and Regulations

MAPI's Legal Analysis and Regulations series covers a full range of management issues from human resources, taxes, government contracts, products liability, international operations, environmental legislation and regulations, to antiboycott regulations. They are designed to provide member company executives with a well-researched and pragmatic overview of emerging issues. Last year MAPI issued more than 30 Legal Analysis and Regulations. Major Legal Analysis and Regulations are noted below.

— *Fetal Protection Policies: A Series of Reports* LAR-183, 177, 168, 164, and 160
— *U.S. Government Measures To Facilitate Commercial Relations With East European Countries* LAR-161 and *An Update* LAR-171
— *OSHA Regulatory Developments: Hazard Communication Standard and Ergonomic Hazards*, LAR-176 and *Ergonomics*, LAR-185; *Proposed Motor Vehicle Occupant Protection Standard*, LAR-181
— *"Americans With Disabilities Act of 1990": A Review and Analysis of the New Law*, LAR-182
— *Crisis in the Middle East: Personnel Management Implications of Call Up of U.S. Military Reservists in Response to Iraqi Invasion of Kuwait*, LAR-186
— *MAPI's Amicus Curiae Brief in Rockwell Graphic Systems, Inc. v.DEV Industries, Inc., et al.*, LAR-172
— *"Older Workers Benefit Protection Act" Is Signed Into Law*, LAR-191
— *Consolidated Returns Regulations: A Series* LAR-166, EL-120, and LAR-193.

Executive Letters and MAPI Comments and Recommendations

The purpose of the MAPI Executive Letters series is to notify interested MAPI member company executives of letters and statements submitted by MAPI to members of Congress, congressional committees, and government departments and agencies on behalf of the membership. In 1990, MAPI filed comments and recommendations to a number of departments and agencies of the U.S. government, some of which appeared in the Executive Letter series, including:

— *Corrective Action for Solid Waste Management Units at Hazardous Waste Management Facilities*, November 1990

In response to the Environmental Protection Agency's request for comments on its proposed corrective action for solid waste management units at hazardous waste management facilities, MAPI commented in particular on the proposed rule on alternative dispute resolution (ADR). MAPI strongly supports the use of ADR in all appropriate disputes among parties, including those involving disagreements over corrective action. As MAPI observed in a letter to the EPA, in a complex area like corrective action, it is important that parties to a dispute use all available resources to resolve their disagreements efficiently so that they may more quickly begin remediation.

— *The Budget Deficit and the Proposal To Disallow Corporate Deductions for Interest Paid on Income Tax Underpayment*, September 1990.

In a letter sent to budget negotiators on the budget deficit reduction plan, MAPI commented on press reports that tentative bipartisan approval had been given to a proposal to disallow corporate deductions for interest paid on underpayments of income tax. MAPI recommended that this proposal be rejected because it would not produce the real and meaningful deficit reduction we do support. And we noted that the proposal would penalize corporate taxpayers without providing lasting relief for the budget. We urged members of Congress and the Administration not to include the interest disallowance proposal in any final budget legislation.

— *Strengthening the Export-Import Bank's Direct Lending Program,* August 1990.

In a letter to the Secretary of Commerce, MAPI urged that the executive branch and the Congress move more promptly to shore up the Export-Import Bank's direct lending program, take the lead by making clear that adequate funding will be available for the support of exports to countries which meet Eximbank's "reasonable assurance of repayment" standard, and include in the federal budget adequate funding to meet Eximbank's estimated demand. Also, we suggested that the executive branch and the Congress should join in an effort to "clean up" the web of statutory and other restrictions in the Export-Import Bank Act concerning the lengthy list of countries where the Bank is prohibited from—or restricted in—supporting exports for various "foreign policy" reasons. We also addressed the issue of reorientation of foreign assistance programs.

— *Consolidated Returns,* EL-120.

The temporary regulations that disallow losses on the disposition (or deconsolidation) of stock in a member of a consolidated group were the subject of a public hearing held by the Internal Revenue Service in late June. The temporary regulations were also the subject of MAPI comments submitted earlier to the IRS. After urging that the temporary rules be withdrawn, at least as temporary and immediately effective regulations, MAPI offered a series of alternative approaches that would address the impact of repeal of the *General Utilities* doctrine on consolidated returns—and particularly the issue of such built-in gain as may be inherent in the assets of a subsidiary whose stock is acquired at a premium—without disallowing true economic losses and without creating an administrative morass.

— *H.R. 4136, A Bill To Remove a U.S. Tax Barrier to U.S. Competitiveness in the European Community,* July 1990.

In a letter to the Chairman of the Ways and Means Committee of the House of Representatives, MAPI stated its support for H.R. 4136, a measure that would treat the countries that comprise the European Community as a single country for purposes of the foreign base company income rules under Subpart F of the Code and thus would remove a significant impediment to efficient and competitive operations by U.S. multinationals in the European Community.

— *Corporate Tax Simplification,* May 1990.

In a letter to the House Ways and Means Committee Chairman, MAPI presented a series of recommendations for simplifying the corporate income tax. MAPI identified a series of provisions whose simplification and rationalization would contribute to a more efficient and administrable tax system. For example, MAPI recommended that the alternative minimum tax for corporations be abandoned and that the foreign tax credit rules be substantially reformed in several respects. Other simplification items include consistency in capital cost recovery for all tax purposes and a uniform definition of compensation for employee benefit purposes.

— *Removing Trade Barriers Imposed by Japanese Auto Companies on U.S. Suppliers,* EL-118

In January 1990, members of the MAPI Board of Trustees met with senior U.S. Department of Commerce officials to discuss the deteriorating United States-Japanese trade position in auto parts. Following that meeting, MAPI was invited to testify at the Auto Parts hearings held on February 26, 1990. Thomas F. Russell,then Chairman, Federal-Mogul Corporation and Chairman of MAPI's Finance Committee, acted as spokesman for the views of a broad range of MAPI member companies. In his testimony, Mr. Russell discussed some of the difficulties in selling both in the Japanese home market and to the Japanese auto transplants—affiliates of Japanese companies in the United States. Because many U.S. suppliers are clearly being denied the opportunity to compete on the basis of price and quality for Japanese business, Mr. Russell recommended that a Section 301 complaint against the Japanese government be filed on behalf of U.S. auto suppliers.

A Selected List of MAPI Publications*

Books

Environmental Regulatory and Management Issues for U.S. Manufacturing Companies (1990) (M $20.00, NM $25.00)

New Trends in Employee Benefits (1990) (M $20.00, NM $25.00)

Government Procurement Issues for the 1990s—Proceedings From the Fifth MAPI Conference (1990) (M $20.00, NM $25.00)

1992: The European Community's Internal Market Program—Opportunities and Challenges for U.S. Firms (1989) (M $25.00, NM $30.00)

Benefit Planning in 1989 (1989) (M $20.00, NM $25.00)

Management Strategies for Controlling Workers' Compensation Costs (1989) (M $20.00, NM $25.00)

The Industry R&D and Technology Resource Directory (1988) (M $35.00, NM $45.00)

A Handbook on Financing U.S. Exports, 5th Edition (1988) (M $25.00, NM $30.00)

Corporate Directors at Risk: Strategies for Protecting Against the Threat of Personal Liability (1988) (M $20.00, NM $25.00)

A Practitioner's Guide to Export Controls: Minimizing A Competitive Disadvantage (1987) (M $40.00, NM $50.00)

Current Employment Law & Human Resources Developments—Proceedings From the MAPI Conference (1987) (M $30.00, NM $50.00)

Management Strategies for Limiting Liability Exposures, Controlling Risk, and Reducing Attendant Cost (1987) (M $15.00, NM $20.00)

The Protection of U.S. Intellectual Property Rights: At Home and Abroad (1986) (M $20.00, NM $30.00)

Company Experiences in Operating Products Liability Programs (1986) (M $10.00, NM $15.00)

Business and Statistical Data Published by the Federal Government for the Business Executive (1985) (M $20.00, NM $30.00)

Trends and Prospects for U.S. Manufacturing in World Markets (1985) (M $20.00, NM $30.00)

Employment Law, Court Interpretations, and Employer Obligations (Second Edition) (1985) (M $15.00, NM $25.00)

Health Care Cost Containment II: Practical Ideas You Can Use (1984) and Health Care Cost Containment I (1982)—Proceedings of MAPI Conferences (M $25.00, NM $30.00)

Productivity: Doing Something About It! Volumes I, II, and III (M $30.00, NM $40.00)

Films

Events at Putnam's Crossing, A MAPI Motion Picture on Products Liability, 16mm Print or 3/4" Videocassette (M $450.00, NM $600.00)

A Practical Method of Investment Analysis—The MAPI System, Filmstrip (M $20.00, NM $25.00) and Script ($2.00)

Studies and Reports

Accounting and Financial Reporting

MAPI Survey on Outside Audit Fees: 1990 (M $20.00, NM $25.00)

An Analysis of Issues in the Standardization of Accounting for Postemployment Benefits Other Than Pensions

The Quantitative Increase and Qualitative Decline of Corporate Indebtedness: Some Remedies (M $10.00, NM $15.00)

Tender Offers: The Search for a Compromise Between Federal and State Takeover Laws (M $15.00, NM $20.00)

*M denotes member company price, NM nonmember price. Except where prices are noted above, all other publications are available at $2.00 per copy. Write to: MAPI, 1200 Eighteenth Street, N.W., Washington, D.C. 20036.

Reporting of Shareholdings by Officers, Directors, and Major Shareowners

The Treadway Commission: A Series ($10.00)

Insider Trading: A Series ($15.00)

Paperwork Burden and Cost: Key Provisions of Paperwork Reduction Act and Its Probable Impact Reviewed (M $3.00, NM $4.00)

Indexation Issue in Inflation Accounting ($3.00)

MAPI Statements and Comments on Securities and Exchange Commission Rule-Making Proceedings, as noted below:
Disclosure of Forecasts of Economic Performance; Environmental Compliance and Other Socially Significant Matters; Auditor-Client Relationships; Receivables and Inventories on Long-Term Contracts; Significant Accounting Policies; Income Tax Expense; New Products and Competitive Conditions; Lease Commitments of Lessees; Questionable Payments; Tender Offers; Internal Accounting Controls; Replacement Costs; Proxy Solicitations; Management Remuneration; Interim Segment Reporting; Opinion Shopping; MD&A; Management Representations to Users of Financial Reports

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—Foreign Tax Credits: Expense Allocation
—Export Source Rule
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December 13, 1990

Mr. Thomas J. Cox
Associate Director for Administration
United States Department of Commerce
National Technical Information Service
5285 Port Royal Road
Springfield, VA 22161

Ref: Final Report for Financial Systems Study

Dear Mr. Cox:

Grant Thornton's final report is transmitted with this letter. We believe it addresses the items in our Statement of Work which called for a financial systems strategy and implementation plan. We are pleased to know that you are satisfied with our work and will provide you with copies of our requirements-related workpapers under separate cover.

Our report reflects the results of a structured and intensive review of NTIS financial system needs, strategic alternatives, costs and benefits, and management priorities. During the study we gained an understanding of NTIS business plans, current systems and procedures and financial management information needs. Our recommendations were developed based on this understanding combined with our knowledge of Federal Government standards for financial systems and internal controls.

Grant Thornton has enjoyed working with your organization to jointly define solutions and strategies. We have factored NTIS technical and resource constraints into our recommended plan, but we believe NTIS has already been making good progress in understanding how to strengthen controls and management reports. In particular, we believe your initiatives to recruit a Chief Financial Officer and add system accountants to your staff will position NTIS to launch a sustained and successful drive for implementing needed financial systems within the overall vision of our jointly developed plan.

Clearly, the Inspector General's recent audit highlighted a number of weaknesses that can be addressed by a combination of new manual procedures and systems. We believe the financial systems priorities in the implementation plan include short-term system solutions that may be helpful in addressing these weaknesses. Specifically, the General Ledger implementation could be noted in your response to that audit.

Further, as we discussed in the meeting on December 11 with Gary Maupin, Commerce CFO, and the Integrated Accounting System project staff, our recommended strategies and implementation plan are not an "all or nothing" approach. Our recommendations include individual application components that can selectively be reviewed for inclusion in larger strategic financial system alternatives for the Department's central system or even cross-servicing arrangements with the Department of Interior's accounting system. The result could be a blended strategy that interfaces NTIS developed and operated systems with a new central systems application (just as today you rely on Department systems for fixed asset and procurement processing) and other agency systems (just as today you use NFC for payroll processing).

We think, however, that any combined strategy must balance your need for functionally and technically responsive systems with cost, operation, and maintenance risk factors. We especially advise caution when reviewing future promises for systems that address your priority needs. Systems with high priority, low to moderate cost and risk can produce a quick enough payback in improved controls and management information to justify proceeding now, even if these systems some years from now are replaced by Department-wide systems.

In particular, there are a number of feasible short-term system initiatives that should be started as soon as it is practical. We believe decisions can be made now to proceed with general projects and new priority systems without risking incompatibility with Department level initiatives:

- Review current audit findings for consistency with the recommended implementation plan and make a management decision to proceed with modernization program priorities.

- Perform recommended general projects to:
  - Establish project controls for costs and schedule management of the implementation plan.
  - Conduct operations review to define responsive financial management services for marketing and production functions and information requirements.
  - Complete organization changes for improved financial management services and policies.
  - Define detailed management report requirements, including data elements, sources, and frequency; this is in addition to current 100 and 110 reports.
- Begin installation of priority systems:
  - General Ledger - define data, chart of accounts, and interface requirements and then proceed with selection and installation.
  - Cost Accounting - define requirements and then proceed with selection and installation.
  - Patent Accounting - define requirements and proceed with design, development and implementation.
  - Inventory Accounting - define requirements for revenue recognition transactions and proceed with design, development and implementation.
- Continue to coordinate with Department staff on requirements for central system, cross-servicing alternatives.

Cost estimates provided with the implementation plan range from $850,000 to $940,000, including approximately $166,000 for NTIS accounting staff time which you may choose to exclude from your analysis. Our estimate includes internal and external labor costs and hardware and application software acquisition costs. We have recommended and provided planning estimates for costs of outside assistance for projects that are on the critical path, require expertise not available internally or require objectivity.

The recommended projects span three years and assuming work begins in January 1991, the costs by fiscal year and priority would be:

FY 1991, High priority:	$290,000 - 295,000
FY 1992, High to Medium Priority:	$315,000 - 320,000
FY 1993, Medium to Low Priority:	$225,000 - 300,000
FY 1994, Low Priority:	$ 20,000 - 25,000

We would be pleased to make a management presentation of our report to others at NTIS or at the Department level. We look forward to continuing our assistance to NTIS.

Very truly yours,

Grant Thornton

Richard B. Willett
Partner

National Technical Information Service

Financial Systems Project

December 1990

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Financial Systems Project

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APPENDICES

Appendix A Project Methodology
Appendix B Objectives and Strategies for the new NTIS Financial System (NFS)
Appendix C NTIS 2000 Business Strategies and Corresponding Strategies for the New Financial System
Appendix D Overview of the Existing System Chart and Narrative
Appendix E Analysis of Model Framework Controls
Appendix F NTIS Requirements Framework
Appendix G Framework for the Integration of Federal Financial Systems (JFMIP's Core Requirements)
Appendix H Description of the Recommended System Design by Module
Appendix I Illustration of Revenue Flow
Appendix J Illustration of Chart of Accounts
Appendix K Organizational and Policy Issues To Be Resolved

Introduction and Executive Summary

SCOPE AND OBJECTIVES

- The objective of the study was to provide guidance on a financial systems strategy at NTIS and involved two major tasks:
  - TASK 1 - Assess NTIS' current business operations, accounting systems, ADP support environment, accounting data needs and reporting requirements, and ability to finance implementation of a new accounting system. Based on this assessment, recommend a cost effective, overall financial systems strategy which will provide NTIS with the data to meet its internal and external reporting requirements.
  - TASK 2 - Recommend those system modules/components which should be incorporated into the new system and strategy, and identify the criteria which NTIS should use in determining the cost effectiveness and strategic fit of the various modules offered in the market.
- The study included NTIS financial systems, related production systems, external reporting requirements, interfaces, management information objectives, and compliance with OMB, Treasury, GAO requirements and JFMIP models. The result of the study is a high level financial management system design with corresponding implementation strategies and projects.

REVIEW PROCESS

- The review was performed using both an operations orientation and a management orientation. The operations approach used current and new system requirements to develop financial systems objectives and strategies. The management orientation used current NTIS business objectives and strategies to develop objectives and strategies for the new system.
- A validation and crosswalk was performed between the operations and management methodologies. A general system design, implementation strategies and priorities, and implementation projects were then defined. The methodology is illustrated in Appendix A.
- Appendix B lists the objectives and strategies for the new financial system (NFS) and Appendix C lists the NTIS 2000 business strategies and corresponding strategies for the new financial system.
- An overview of the existing system is presented in Appendix D. A comparison of existing systems to the PCIE/PCMI model framework is presented in Appendix E.

Introduction and Executive Summary (continued)

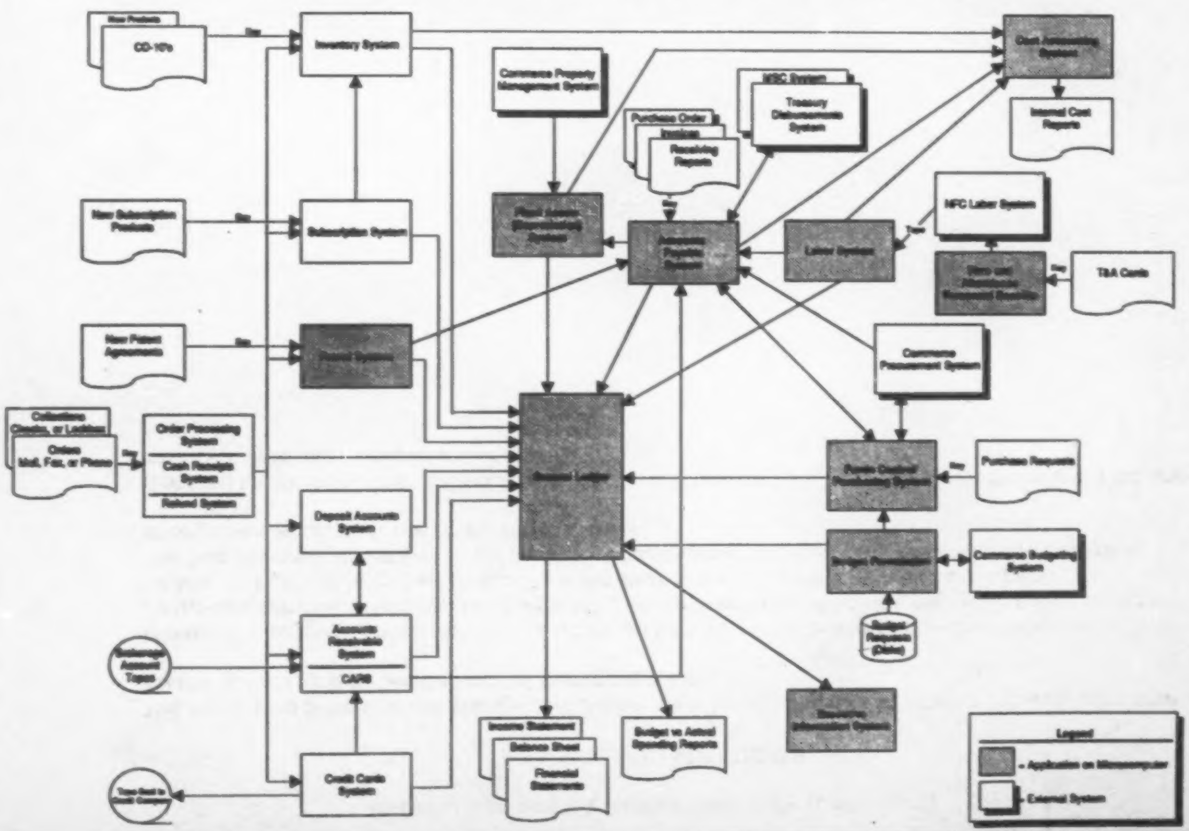
MAJOR DESIGN STRATEGIES

- Major objectives of the financial management system are to improve financial information services, strengthen internal controls, and modernize financial management services.

- In order to strengthen controls, the general ledger will form the central control point in the new system strategy. To facilitate accurate, timely, and reliable reporting, the general ledger will be the main source of management reports. The general ledger will be supplemented by specialized reports from subsidiary ledgers.
- The financial management system will be microcomputer based wherever possible to facilitate responsive management reporting, flexibility, and maintainability.

- A phased approach to implementation will be used to minimize risk. Highest priority projects are those that impact internal controls and management information.

National Technical Information Service
Recommended Design of the Financial Management System


New Products
CO-10's
Key
Inventory System
Commerce Property Management System
New Subscription Products
Subscription System
New Patent Agreements
Patent System
Collections Checks, or Lockbox
Orders Mail, Fax, or Phone
Order Processing System
Cash Receipts System
Refund System
Deposit Accounts System
Accounts Receivable System
CARS
Credit Card System
Fixed Assets (Depreciation) System
Purchase Order
Invoices
Receiving Reports
Accounts Payable System
Treasury Disbursements System
Cost Accounting System
Internal Cost Reports
NFC Labor System
Tape
Labor System
T&A Cards
Commerce Procurement System
General Ledger
Funds Control Purchasing System
Purchase Requests
Budget Formulation
Commerce Budgeting System
Budget Requests (Data)
Income Statement
Balance Sheet
Financial Statements
Budget vs Actual Spending Reports
Executive Information System
Legend
= Application on Microcomputer
= External System

Recommended General Design of the Financial Management System

OVERALL DESIGN STRATEGIES AND ASSUMPTIONS

- NTIS general requirements were defined in relation to the user community and financial management considerations (see Appendix F). Trade-offs between manual and automated solutions will be done during detailed requirements definition.

- Key design considerations included meeting OMB Circular A-123, A-127, and GAO Title 2 requirements.

- The design was developed using JFMIP's Core Requirements as a basis (see Appendix G for an illustration).

- The General Ledger will provide centralized controls for the new system and will drive most management reports.

- The new system was designed to be modular for the following reasons:
  - Ease of maintenance
  - Ability to grow and enhance the system components
  - Modularity reduces the risk of dependence on key persons and allows maintenance, documentation and an understanding of system components to be broken down into manageable units.

- Subsidiary ledger controls have been considered a key component of the design. Subsidiary ledger controls include centralizing specialized transaction processing functions in one area, such as cash collections and revenue recognition.

- The design is built around the ability to interface and download from the IBM mainframe to microcomputers.

OVERALL DESIGN STRATEGIES AND ASSUMPTIONS(continued)

To describe our recommended system design, we have divided the accounting system into:

- Revenues
- Expenses
- Assets
- Liabilities
- Other, including Budget, Funds Control, and Reporting.

Descriptions of each area and systems within each area are presented below. The descriptions reflect how the systems will function in our recommended design. A description of the general system requirements, inputs, outputs and interfaces is presented in Appendix H.

System Description

REVENUES

The system will track three kinds of revenue:

- Demand Orders, including subscriptions
- Patent Revenue
- Brokerage Services Revenue.

ORDER PROCESSING SYSTEM (OPS) processes demand orders using a centralized system and database. OPS maintains a database of customers, orders and payments:

- Customer Name and Number
- Ship to Address
- Bill to Address
- Type of Payment (Cash, Ship&Bill, Deposit Account, CC)
- Deposit Account Number and Balance (if applicable)
- Credit Limit Available (if applicable)
- Credit Card Type, Number (if applicable)
- Brokerage Accounts (if applicable)
- Patents Licensed (if applicable)
- Current Orders and Ship Dates
- Subscriptions
- Payments

The Order Processing Department accesses the database by entering a customer number. This limits the data entry required for repeat customers. After a period of time, the database is cleared for inactive customers. The Order Processing database is then used to update the Marketing Database.

System Description (continued)

OPS updates the Inventory System and Subscription System for items ordered. OPS also interfaces with the Deposit Accounts System, Credit Card System, and Accounts Receivable for orders placed by each method of payment. OPS updates the General Ledger for revenue.

CASH RECEIPTS SYSTEM (subsystem of OPS and currently named Cash Management System) works as a director of cash receipts to the appropriate area. When a collection is received, it is credited toward current orders, Deposit Account replenishment, patents, brokerage services or subscription in the Order Processing Customer Database. This helps in identifying collections from the initial receipt of the check and helps in eliminating unapplied collections not subject to suspense controls. This will also centralize cash reconciliations and deposit confirmation controls.

REFUND SYSTEM processes product returned to NTIS and credit memos issued to customers. Refunds updates the Order Processing Database for credits to a customer. Refund interfaces to the Inventory System for the product returned to inventory and interfaces to the appropriate payment system to credit the customer's accounts. Refund System credits the customer's Accounts Receivable, Deposit Account or Credit Card depending on the type of payment. For cash payments from one-time customers, a manual interface to Accounts Payable will be created.

INVENTORY SYSTEM tracks each product by a product number. New products and increases to existing products are entered into the system. Shipments are received from OPS and Subscription System. Inventory contains shipment information by product. Inventory also tracks backorders and returns. The Inventory System sends inventory purchases for inventory, shipments and Cost of Goods Sold to the General Ledger.

Revenues are divided between earned revenue and unearned revenue. Unearned revenue is recognized when an order is placed and flows to the General Ledger from Order Processing. Earned revenue is recognized when product is shipped. For demand orders, the Order Processing System tells the Inventory System to ship products and recognize the revenue. For subscriptions, the Subscription System tracks subscription orders and tells the Inventory System to fill a subscription and recognize the revenue. An example of this process is located in Appendix I.

System Description (continued)

PATENT SYSTEM tracks patents available for licensing and the licenses that have been issued and the patent royalties (revenue earned by NTIS and royalties owed to inventors). Patent collections are received from the Cash Receipts Subsystem of the Order Processing System. The Patent System interfaces to the Accounts Payable System for the royalties owed to the inventors and interfaces with the General Ledger for patent revenue earned by NTIS.

CREDIT CARDS SYSTEM (CC) receives orders placed by credit card from Order Processing. CC produces a tape and/or a bill which is sent to credit card companies. CC interfaces with Accounts Receivable System to set up a receivable for the credit card companies. When remittance is received from the Credit Card Company, the system reconciles billing and interfaces with Accounts Receivable to apply remittances to open accounts.

System Description (continued)

EXPENSES

Expenses are of three types:

- Operating
- Labor Costs
- Depreciation.

Operating Expenses are processed through the Accounts Payable System, labor is processed through the Labor System (NFC, Time and Attendance and Labor Distribution) and depreciation is calculated through Fixed Assets (Depreciation) System.

ACCOUNTS PAYABLE SYSTEM (AP) processes NTIS operating liabilities and expenses. AP receives a Purchase Order from procurement. The PO is matched to the Purchase Request which has been authorized by Budget. The Purchase Request approval is contained in the Funds Control System. AP is integrated with Funds Control to enable the matching of Purchase Request and Purchase Order. When an invoice and receiving report (if applicable) are received, the are matched to the PO. The payment to the vendor is warehoused until the due date of the invoice. AP also tracks Prompt Payment information.

AP receives liabilities from the Patent System, CARS, Procurement System and Refunds. AP also tracks accruals and receives and reconciles information from MSC at the Commerce Department for invoices paid by MSC. AP communicates with the Treasury Department to supply disbursement schedules. AP updates the General Ledger for expenses, liabilities, obligations and disbursements.

LABOR SYSTEM tracks labor hours and costs by employee. Time and Attendance data is sent to National Finance Center (NFC) payroll system. NFC computes the payroll and issues payments to employees. The labor costs are returned and a Labor Distribution is completed. The labor data is interfaced to the General Ledger, as well as accruals for benefits and leave.

FIXED ASSETS (DEPRECIATION) SYSTEM tracks fixed assets. Depreciation is calculated and interfaced to the General Ledger.

System Description (continued)

ASSETS

Several types of assets are tracked by the system, including:

- Cash
- Customer Deposits
- Accounts Receivable and Brokerage Receivables
- Inventory
- Fixed Assets.

Cash includes cash receipts and cash disbursements. Cash receipts are tracked by the Cash Receipts System (subsystem of Order Processing). Cash Receipts interfaces to the General Ledger for cash received for Cash Sales, Accounts Receivable Payments and Deposit Account Replenishments. Receipts for patent royalties and brokerage services are also tracked by the Cash Receipts System.

Cash Disbursements are processed by the Accounts Payable System and interfaced to the General Ledger.

DEPOSIT ACCOUNTS SYSTEM (DA) tracks the deposit account balances by deposit account number. New accounts and DA replenishments are received from the Cash Receipts System (subsystem of OPS). OPS interfaces to DA for orders placed against each account. Periodically, DA updates OPS for the current account balance for each customer. This enables the Order Processing Department to tell customers that the DA is overdrawn and must be replenished. DA interfaces to the General Ledger with the Customer Deposit Balance (cash belonging to customers) and the related liability. The Accounts Receivable System is then updated for overdrawn accounts to ensure the receivable is classified correctly in the General Ledger.

ACCOUNTS RECEIVABLE SYSTEM (AR) tracks money owed to NTIS by customer. The system tracks Ship&Bill orders, overdrawn Deposit Accounts and Credit Card Company receivables. The information for each customer includes orders placed, payments received, and credit authorization. AR communicates with Deposit Accounts System for overdrawn accounts and replenishments to the accounts. AR also communicates with the Credit Cards System to set up a receivable for the balance due from Credit Card Companies. AR feeds the General Ledger for receivables due from customers, overdrawn Deposit Accounts and credit card companies.

System Description (continued)

CONSOLIDATED ACCOUNTS RECEIVABLE SYSTEMS (CARS) processes billings and receivables for brokerage services clients. CARS reads a tape submitted by the clients and produces billings and a receivable by customer. Payments for these services are received from the Cash Receipts System (subsystem of Order Processing). CARS calculates the revenue NTIS has earned on the brokerage services and the liability for funds owed to clients. The liability is sent to the Accounts Payable System and the revenue to the General Ledger.

INVENTORY is tracked by product in the Inventory System. The system summarizes purchases, shipments and breakage, as well as calculating Cost of Goods Sold.

FIXED ASSETS are tracked through the Commerce Property Management System. The system currently does not calculate depreciation. The Fixed Asset (Depreciation) System calculates depreciation by item. The depreciation and fixed asset purchases and deletions are interfaced to the General Ledger. This may be a short-term solution until the Commerce system is working correctly.

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System Description (continued)

LIABILITIES

Liabilities are of six types:

- Accounts Payable Liabilities
- Patent Royalties Liabilities
- Brokerage Services Liabilities
- Subscription Escrow
- Customer Deposits
- Labor Accruals.

Three types flow through the Accounts Payable System: AP, Patent Royalties and Brokerage Services liabilities. These liabilities require a disbursement be made, which is completed in AP. AP receives data from the Patent System and the CARS, as well as computing the Accounts Payable Liability. AP interfaces to the General Ledger.

SUBSCRIPTION SYSTEM tracks subscription orders and products. The Subscription System tracks subscriptions outstanding and sends out renewal notices to customers. Subscription System communicates with the Inventory System to ship subscription fulfillments, and interfaces to the General Ledger for the Subscription Liability (Escrow). Subscription revenue is recognized when the document is actually shipped through the Inventory System.

DEPOSIT ACCOUNTS SYSTEMS processes customer deposits liability and interfaces to the General Ledger. (see Assets Description)

TIME & ATTENDANCE SYSTEM processes time and attendance data and transmits the data to NFC. NFC computes and pays the payroll. Time & Attendance System calculates labor accruals for benefits and leave. The accruals are interfaced to the General Ledger.

LABOR SYSTEM uses a tape from NFC to produce a Labor Distribution. The Labor Distribution is used by the Cost Accounting Module to apply labor costs to products. Undistributed labor costs are interfaced to the General Ledger for control over cost accounting process.

System Description (continued)

OTHER

BUDGET is formulated annually using input from management of all areas of NTIS. The budget must be compiled and sent to Commerce. The budget is translated into a financial plan and entered into the General Ledger and the Funds Control Module. Projections and other budget data are interfaced to the General Ledger for management reports.

FUNDS CONTROL uses the financial plan to process purchase requests and contracts. Purchase requests and contracts are compared to the financial plan and approved if funds are available for the purchase. The Accounts Payable System uses the database created by Funds Control to ensure that Purchase Orders that were submitted were approved in the Funds Control Module.

REPORTING is done for internal and external sources by the General Ledger and the Cost Accounting Modules. All modules are able to produce reports with the detail kept in each module.

GENERAL LEDGER produces internal and external reports and financial statements: Balance Sheet, Income Statement and Statement of Cash Flows. The GL also produces Budget vs Actual reports on organization code and project number and control key operating statistics (e.g. units sold). The General Ledger contains accounts by Account Number, Object Class, Organization Code and Project Code. An example is presented in Appendix J. The GL provides basic internal controls over classification and aggregation of data, and assurance that all events and activities are accounted for in the correct accounting period, in accordance with the Standard General Ledger Model, JFMIP's Core Requirements and GAO Title 2.

The General Ledger provides most of the reporting needs of management. Reports needing product or transaction detail at a lower level in the production systems or the Cost Accounting Module or revenue processing.

COST ACCOUNTING MODULE uses data from Labor, Accounts Payable, Inventory and Fixed Assets Systems. Using allocation tables, Cost Accounting allocates direct and indirect costs to products. Reports are produced by product for costs and interfaced to the General Ledger for management reports that combine costs and revenues.

System Description (continued)

EXECUTIVE INFORMATION SYSTEM provides management with information regarding key performance indicators for operations. This may include sales analysis, production statistics, quality statistics, inventory turnover, backorders, order response time, labor productivity statistics and overtime. The information may be downloaded from production systems such as Inventory and Order Processing, and the General Ledger. Time series database maintained by this system support exception and trend analysis and produces reports on demand, current on daily, weekly and monthly cycles. Report screens will be defined for each user and are data independent for cost effective, flexible and frequent maintenance. Ease of use and ability to expand as information requirements grow is critical to success of this system.

Recommended Implementation Strategies

ASSUMPTIONS AND OVERALL IMPLEMENTATION STRATEGIES

- Wherever possible, a package solution is recommended for applications where:
  - Performance, volume, and technical environment constraints are not limiting factors for selected applications.
  - Package is likely to meet internal control requirements without high learning curve costs.
  - Development and maintenance costs are lower due to limited custom requirements.
  - Package reduces key person dependency for maintaining software.
  - Package is designed for broader market and has flexibility for changing requirements and growth.

  If a detailed package search does not yield a package that meets the system requirements, then a custom approach will need to be followed.

- A purchased package may require some customization but for selected applications, NTIS requirements are generic. Unique requirements for input and output processing can be done through package tools.

- Detailed requirements definition and a complete system development life cycle process will be used for each custom system or enhancement to ensure that requirements and internal controls are included.

- Wherever possible, existing equipment and system software will be used. Use of minicomputers or new systems software (e.g., Unix) would add unwarranted complexity to development and maintenance.

- Benefits for the implementation alternatives are assumed to be achieved through functional fit to the requirements. No specific cost savings or revenue enhancements were identified.

- The following alternatives were considered for each system module:
  - Replace or enhance the existing system
  - Purchase an existing software package or custom develop software. Purchasing software could include acquiring other government software.
  - Run the software on a mainframe or a microcomputer

Recommended Implementation Strategies (continued)

- Each alternative was evaluated for the following:

    - Degree of fit to functional and technical requirements
    - Estimated costs for development/acquisition, maintenance, and operation
    - Estimated risk that solution will not satisfy internal control or management information objectives.

- The following matrix presents a summary of the recommended alternative for each system module. The rationale for each recommendation follows the summary.

Summary of Recommended Implementation Strategies

(an X indicates the recommended strategy for each module)

	REPLACE THE EXISTING SYSTEM				ENHANCE THE EXISTING SYSTEM	
MODULE	MICRO CUSTOM SYSTEM	MICRO* BUY PACKAGE	MAINFRAME CUSTOM SYSTEM	MAINFRAME BUY PACKAGE	MICRO CUSTOM SYSTEM	MAINFRAME CUSTOM SYSTEM
G/L		X				
Funds Control					X	
A/P					X	
A/R			X(In process)			
Deposit Accounts				X		
CARS						X
Cost Accounting		X				
Order Processing			X(Currently planned)			
Credit Cards						X
Cash Receipts						X
Refunds						X
Inventory						X
Subscription						X

* May be DOS based microcomputer with interface to MACINTOSH

Summary of Recommended Implementation Strategies (continued)

MODULE	REPLACE THE EXISTING SYSTEM				ENHANCE THE EXISTING SYSTEM	
	MICRO CUSTOM SYSTEM	MICRO* BUY PACKAGE	MAINFRAME CUSTOM SYSTEM	MAINFRAME BUY PACKAGE	MICRO CUSTOM SYSTEM	MAINFRAME CUSTOM SYSTEM
Fixed Assets (Depreciation)	X					
Time & Attendance					X	
Labor System						X
Budget Formulation					X	
Patent System	X					
Executive Info. System		X				

* May be DOS based microcomputer with interface to MACINTOSH

National Technical Information Service
Recommended Implementation Alternatives

Module	Strategy	Rationale for Recommendation		
		Fit to Requirements	Cost	Risk
General Ledger	Purchase a micro-based G/L package.	Flexibility: · Changes to reports · Changes to Chart of Accounts · Table driven · Ease of inquiry for reporting and data manipulation. Integrates with other vendor modules (if purchased).	Lower development cost than a custom solution. Lower maintenance costs than a main-frame based package given the size of NTIS. Package is vendor maintained.	Maintains control within the accounting department. Contains standard internal controls for: · Inputs · Processing · Outputs. G/L is a standard application and it is likely that a package can be found to meet requirements (this may require a DOS application). Interfaces can generally be written without changing the purchased G/L software. Contains user documentation and provides training . Has been used and tested in other organizations.
Funds Control	Enhance the existing micro-based custom developed system.	Maximizes fit to requirements since a custom approach is used. Current system is flexible and easily modified.	Maximizes existing investment. Lowest development cost given the existing system.	An established system minimizes implementation risk. Maintains control within the accounting department.

National Technical Information Service
Recommended Implementation Alternatives

Module	Strategy	Rationale for Recommendation		
		Fit to Requirements	Cost	Risk
Accounts Payable	Enhance the existing micro-based custom developed system.	Maximizes fit to requirements since a custom approach is used. Current system is flexible and easily modified.	Much of the functionality of commercially available A/P solutions would not be used given the NTIS environment. Maximizes existing investment in the current system. Lowest development cost given the existing system.	An established system minimizes implementation risk. Integration required with the funds control module currently occurs with the existing system. Maintains control within the accounting department.
Accounts Receivable	Replace the existing Accounts Receivable system with a custom developed (A/R 90). NOTE: This strategy is currently being implemented with the A/R 90 system.	Maximizes fit to requirements since a custom approach is used.	Maximizes investment in the development of the A/R 90 system . Lowest development cost given the level of completion of the new A/R 90 system (approximately 60% complete).	An existing design that has been approved by system users minimizes implementation risk. Level of completion of A/R 90 design minimizes estimating errors in determining completion costs/timeframe for the system.

National Technical Information Service
Recommended Implementation Alternatives

Module	Strategy	Rationale for Recommendation		
		Fit to Requirements	Cost	Risk
Deposit Accounts	Replace the existing mainframe based custom developed system with a new custom developed mainframe system.	Maximizes fit to requirements since a custom approach is used. Transaction volume and interfaces to other NTIS systems make a custom mainframe system the best solution.	The current system is written in assembler and enhancement is not cost justified.	Lowest risk due to requirement interfaces.
CARS	Enhance the existing mainframe-based custom developed system.	Mainframe power is required for the volume and interfaces associated with this application. A custom approach maximizes fit to requirements. It is expected that major changes for new requirements will not be required.	Maximizes existing investment in the current system. Lowest development cost since modifications to the current system can be made.	An established system minimizes implementation risk.

National Technical Information Service
Recommended Implementation Alternatives

Module	Strategy	Rationale for Recommendation		
		Fit to Requirements	Cost	Risk
Cost Accounting	Purchase a micro-based package.	Flexibility: · Changes to reports · Ease of inquiry for reporting and data manipulation. Integrates with G/L module from the same vendor.	Lower development cost than a custom solution. Lower maintenance costs than a mainframe based package. Package is vendor maintained.	Maintains control within the accounting department. Contains standard internal controls for: · Inputs · Processing · Outputs. Contains user documentation and provides training. Has been used and tested in other organizations.
Order Processing	Replace the existing system with custom developed mainframe-based software. NOTE: The current NTIS strategy is to replace this system during the next two years.	Mainframe system is required for the order processing volume. A custom approach maximizes fit to requirements. A custom approach is required for interfaces (e.g., Patent system, Subscriptions) and the various payment methods.	The current system is written in assembler and enhancement is not cost justified.	Interface risks are lowest with a custom solution due to special requirements for interfaces to other custom developed software.

National Technical Information Service
Recommended Implementation Alternatives

Module	Strategy	Rationale for Recommendation		
		Fit to Requirements	Cost	Risk
Credit Card System	Enhance the existing custom developed mainframe based software.	Mainframe power is required for the volume and interfaces associated with this application. A custom approach maximizes fit to requirements. It is expected that major changes for new requirements will not be required.	Maximizes existing investment in the current system. Lowest development cost since modifications to the current system can be made.	An established system minimizes implementation risk.
Cash Receipts System (currently called the Cash Management System)	Enhance the existing custom developed mainframe based software.	Mainframe power is required for the volume and interfaces associated with this application. A custom approach maximizes fit to requirements. It is expected that major changes for new requirements will not be required.	Maximizes existing investment in the current system. Lowest development cost since modifications to the current system can be made.	An established system minimizes implementation risk.

National Technical Information Service
Recommended Implementation Alternatives

Module	Strategy	Rationale for Recommendation		
		Fit to Requirements	Cost	Risk
Refunds System	Enhance the existing mainframe based system.	Highest fit to requirements due to interfaces to Order Processing and Cash Receipts. Mainframe system required for interfaces.	Lowest cost since enhancement to existing system.	Lowest risk due to interfaces.
Inventory	Enhance the existing custom developed mainframe based software.	Mainframe power is required for the volume and interfaces associated with this application. A custom approach maximizes fit to requirements. It is expected that major changes for new requirements will not be required.	Maximizes existing investment in the current system. Lowest development cost since modifications to the current system can be made.	An established system minimizes implementation risk.

National Technical Information Service
Recommended Implementation Alternatives

Module	Strategy	Rationale for Recommendation		
		Fit to Requirements	Cost	Risk
Subscription System	Enhance the existing custom developed mainframe based software.	Mainframe power is required for the volume and interfaces associated with this application. A custom approach maximizes fit to requirements. It is expected that major changes for new requirements will not be required.	Maximizes existing investment in the current system. Lowest development cost since modifications to the current system can be made.	An established system minimizes implementation risk.
Fixed Assets (Depreciation)	Custom develop micro based software Note: This may be a short term alternative until the main Commerce Property Management System provides this service.	The fixed assets function deals specifically with depreciation. A custom solution will most effectively provide this function. A custom solution will be the most flexible.	The custom approach will be the most cost effective due to the simple nature of the application. The solution could be a spreadsheet application.	The custom approach offers the lowest risk due to the simple nature of the requirements. A low investment will be required to develop software for computing and tracking depreciation.

National Technical Information Service
Recommended Implementation Alternatives

Module	Strategy	Rationale for Recommendation		
		Fit to Requirements	Cost	Risk
Time and Attendance	Enhance the existing micro based time and attendance software.	Enhancing the existing system offers the greatest fit to requirements.	Given the nature of the new requirements, enhancing the existing system is most effective. Major changes to the existing system are not anticipated.	An established system minimizes implementation risk.
Labor System	Enhance the existing mainframe based system that produces the labor distribution.	Enhancing the existing system offers the greatest fit to requirements.	Given the nature of the new requirements, enhancing the existing system is the most cost effective alternative. Major changes to the existing system are not anticipated.	An established system minimizes implementation risk.

National Technical Information Service
Recommended Implementation Alternatives

Module	Strategy	Rationale for Recommendation		
		Fit to Requirements	Cost	Risk
Budget Formulation System	Enhance the existing micro-based package.	Enhancing existing system will most closely meet requirements. Micro-based system is most flexible for reporting needs.	Development costs will be lowest for enhancing the existing system.	Lowest risk is to enhance the existing system. Enhancing existing system maintains control within accounting.
Patent System	Custom develop micro based software.	The Patent application is somewhat unique and will require custom developed software. A micro based solution gives the greatest flexibility to system users for reports and management information. A micro based solution most easily integrates with a micro based General Ledger and Accounts Payable system.	A micro based solution is more cost effective than a mainframe based solution. Since no system currently exists, enhancing an existing system is not an option.	The custom approach offers the least development and implementation risk because it is unlikely that a package solution could be found for this application.

National Technical Information Service
Recommended Implementation Alternatives

Module	Strategy	Rationale for Recommendation		
		Fit to Requirements	Cost	Risk
Executive Information System	Purchase a micro based package.	A purchased package will most closely meet executive information requirements by providing data independence from applications, flexibility, and pre-defined tools for obtaining information from the system. A micro based package will most easily be able to obtain the required data from the financial systems.	Development costs will be lowest for a package.	Development risk is lowest with a package because the package has already been used and tested in other organizations. Maintains control within the accounting department. Contains user documentation and provides training. Has been used and tested in other organizations.

Recommended Projects for the Implementation Strategy

Implementation projects fall into two categories:

- Application projects
- General projects

Application projects relate to specific tasks to be accomplished for each application module in the new system. General projects are not application specific but relate to the financial management system as a whole. Each type of project is described below:

GENERAL PROJECTS (apply across the entire system)

- Develop a five-year systems plan.
- Perform an operations review to define cost and revenue accounting methodologies and confirm information requirements.
- Define the management reports required from the new system.
- Define the level of detail required in the general ledger, revise the chart of accounts and classification structure accordingly. Define interface specifications for feeder systems.
- Procure hardware and systems software required for new applications to be purchased.
- Resolve organizational and policy issues related to the financial management system. Specific issues identified during this study are listed in Appendix K.
- Train backup personnel in the software maintenance for custom developed systems (reduces risk of key person dependency).

Recommended Projects for the Implementation Strategy (continued)

APPLICATION PROJECTS

- Develop detailed implementation plan and organize project teams with user and system representatives for each priority application.
- Perform a detailed requirements definition.
- For package solutions, perform the following steps:
  - Create an RFP based on the requirements definition.
  - Define prospective software packages/vendors and mail the RFP to the vendors.
  - Evaluate RFP responses. Schedule and attend vendor demonstrations of the most likely software packages based on RFP responses.
  - Define customization, if any, to be done to the packaged software.
  - Determine which package (if any) meets the stated requirements. If no packages meet the requirements, perform the steps for custom development of the software (see next step).
  - Acquire the software. Develop interfaces and make modifications as required.
- For custom solutions, perform the following steps:
  - Define specifications for the software.
  - Program and test the software.
- For all projects, implement the software. Implementation tasks include:
  - Data conversion and system testing
  - Training, user acceptance testing, developing system and user manuals

Recommended Priorities for the General Implementation Projects

PROJECT*	ESTIMATED DURATION	IMPACT ON INTERNAL CONTROLS	IMPACT ON MANAGEMENT INFORMATION	PRIORITY
Develop 5 year plan	1 month	HIGH	HIGH	NEAR
Perform operations review to define cost and revenue accounting methodology	1 month	LOW	HIGH	MEDIUM
Define management reports required for the new system (Layouts, examples)	2 months	LOW	HIGH	NEAR
Define level of detail for G/L; revise chart of accounts	2 months	HIGH	HIGH	NEAR
Procure hardware and systems hardware required for new application software	Dependent on the application			
Resolve organizational and policy issues	2 months	HIGH	HIGH	MEDIUM
Train backup personnel in maintenance for custom developed software	Dependent on the application			

*Assumes that general projects are performed by the Accounting Department

Recommended Priorities for the Application Implementation Projects

MODULE	(1) ENHANCE REPLACE	(2) EST. COST	IMPACT ON ESTIMATED DURATION	IMPACT ON INTERNAL CONTROLS	MANAGEMENT INFORMATION	(3) PRIORITY
G/L	REPLACE	30	6 MONTHS	HIGH	HIGH	NEAR
Funds Control	ENHANCE	6	1 MONTH	MEDIUM	MEDIUM	MEDIUM
A/P	ENHANCE	6	1 MONTH	MEDIUM	MEDIUM	MEDIUM
A/R	REPLACE	120	9 MONTHS	HIGH	MEDIUM	MEDIUM
Deposit Accounts	REPLACE	50	6 MONTHS	LOW	MEDIUM	LONG (AFTER A/R)
CARS	ENHANCE	6	1 MONTH	LOW	LOW	LONG

(1) Estimated costs are in thousands and include hardware and software. The cost assumes a rate of $50/hour for OCCS or contractor time but does not include implementation time for the accounting staff. The estimates represent an order of magnitude and reflect our best estimate based on the information available at the time of the study.

(2) Elapsed time

(3) Near term = Immediate implementation
Medium term = Implementation will begin in 6-12 months
Long term = Implementation will begin in more than 12 months

Recommended Priorities for the Application Implementation Projects (continued)

MODULE	(1) ENHANCE REPLACE	(2) EST. COST	ESTIMATED DURATION	IMPACT ON INTERNAL CONTROLS	IMPACT ON MANAGEMENT INFORMATION	(3) PRIORITY
Cost Accounting	REPLACE	20	6 MONTHS	HIGH	HIGH	NEAR (AFTER G/L)
Order Processing	REPLACE	100	12 MONTHS	HIGH	HIGH	MEDIUM
Credit Cards	ENHANCE	6	1 MONTH	MEDIUM	LOW	LONG
Cash Receipts	ENHANCE	18	3 MONTHS	HIGH	LOW	MEDIUM (WITH ORDER PROCESSING)
Refunds	ENHANCE	18	3 MONTHS	HIGH	LOW	MEDIUM (WITH ORDER PROCESSING)
Inventory	ENHANCE	24	4 MONTHS	HIGH	HIGH	NEAR
Subscription	ENHANCE	12	2 MONTHS	LOW	LOW	LONG
Fixed Assets (Depreciation)	REPLACE	6	1 MONTH	MEDIUM	LOW	MEDIUM

(1) Estimated costs are in thousands and include hardware and software. The cost assumes a rate of $50/hour for OCCS or contractor time but does not include implementation time for the accounting staff. The estimates represent an order of magnitude and reflect our best estimate based on the information available at the time of the study.

(2) Elapsed time

(3) Near term = Immediate implementation
Medium term = Implementation will begin in 6-12 months
Long term = Implementation will begin in more than 12 months

Recommended Priorities for the Application Implementation Projects (continued)

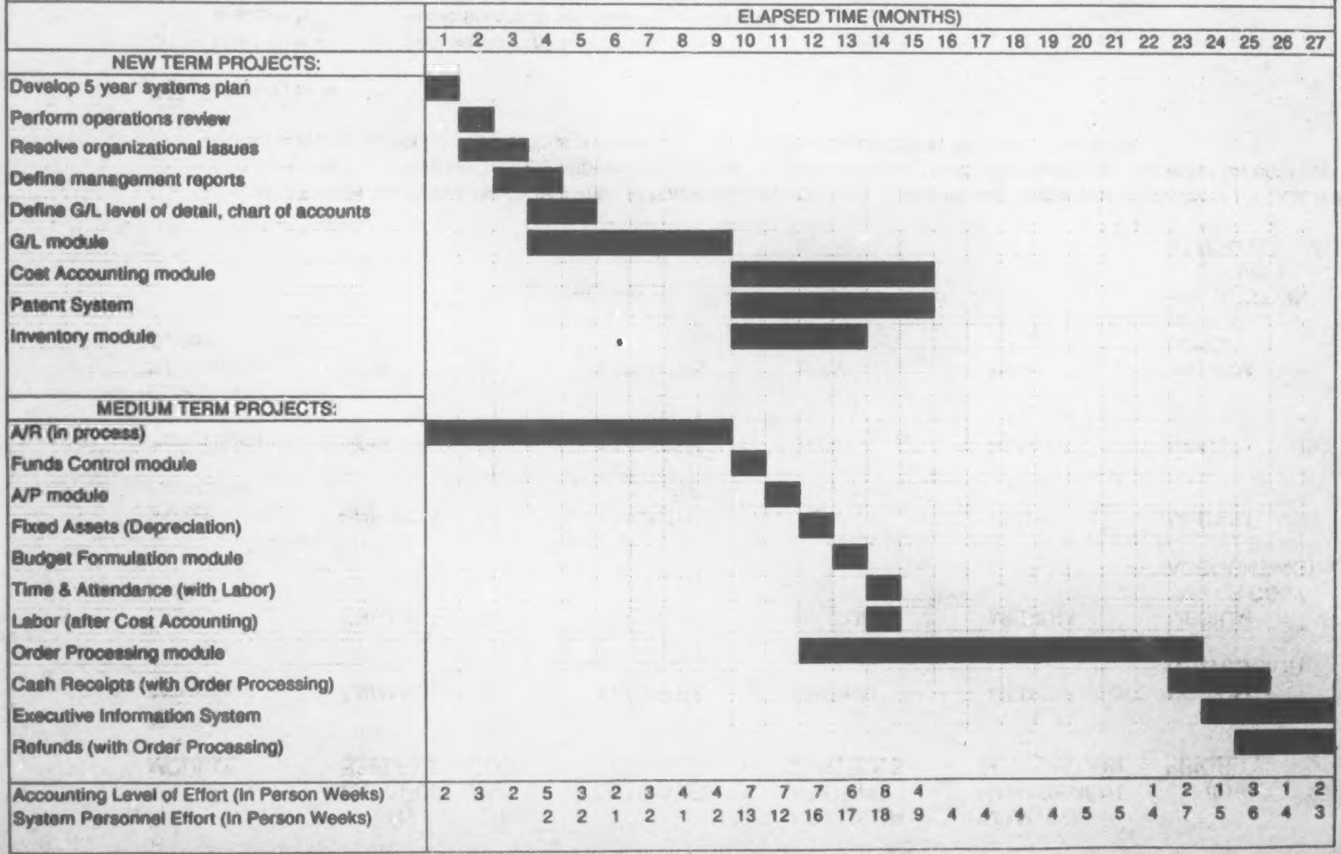
MODULE	(1) ENHANCE REPLACE	(2) EST. COST	ESTIMATED DURATION	IMPACT ON INTERNAL CONTROLS	IMPACT ON MANAGEMENT INFORMATION	(3) PRIORITY
Time & Attendance	ENHANCE	6	1 MONTHS	MEDIUM	MEDIUM	MEDIUM (WITH LABOR)
Labor System	ENHANCE	6	1 MONTH	MEDIUM	MEDIUM	MEDIUM (AFTER COST ACCOUNTING)
Budget Formulation	ENHANCE	6	1 MONTH	LOW	HIGH	MEDIUM
Patent System	NEW	50	6 MONTHS	HIGH	HIGH	NEAR
Executive Information System	NEW	50	4 MONTHS	LOW	HIGH	MEDIUM-LONG (AFTER PRODUCTION SYSTEMS STABILIZE)

(1) Estimated costs are in thousands and include hardware and software. The cost assumes a rate of $50/hour for OCCS or contractor time but does not include implementation time for the accounting staff. The estimates represent an order of magnitude and reflect our best estimate based on the information available at the time of the study.

(2) Elapsed time

(3) Near term = Immediate implementation
Medium term = Implementation will begin in 6-12 months
Long term = Implementation will begin in more than 12 months

PROPOSED SCHEDULE FOR FINANCIAL SYSTEMS IMPLEMENTATION



	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
Accounting Level of Effort (In Person Weeks)	2	3	2	5	3	2	3	4	4	7	7	7	6	8	4							1	2	1	3	1	2
System Personnel Effort (In Person Weeks)				2	2	1	2	1	2	13	12	16	17	18	9	4	4	4	4	5	5	4	7	5	6	4	3

PROPOSED SCHEDULE FOR FINANCIAL SYSTEMS IMPLEMENTATION - continued

LONG TERM PROJECTS:	ELAPSED TIME (MONTHS)								
	28	29	30	31	32	33	34	35	36
Credit Cards	■								
Subscription	■	■							
Deposit Accounts (after A/R)			■	■	■	■	■	■	
CARS									■
Accounting Level of Effort (In Person Weeks)	2		1	1			1	1	1
System Personnel Effort (In Person Weeks)	6	3	2	2	2	2	2	2	3

ESTIMATED COSTS FOR FINANCIAL SYSTEMS IMPLEMENTATION

	(1) NTIS LABOR ESTIMATES (IN PERSON WEEKS)		(2) COST ESTIMATES IN $THOUSANDS (ROUNDED TO NEAREST $5000)			
			LABOR			
NEAR TERM PROJECTS:	NTIS ACCTG STAFF	TOTAL SYSTEMS STAFF	NTIS	OUTSIDE CONSULT.	PACKAGE	TOTAL
Develop 5 year systems plan	2		5	20		25
Perform operations review	2		5	25		30
Resolve organizational issues	2		5	0		5
Define management reports	2		5	20		25
Define G/L level of detail, chart of accounts	2	1	5	20		25
G/L module	15	9	50	0	5–10	55 - 60
Cost Accounting module	15	9	50	0	5–10	55 - 60
Patent System	4	25	50	0		50
Inventory module	4	12	30	0		30
MEDIUM TERM PROJECTS:						
A/R (in process)	3	60	125	0		125
Funds Control module	2	4	15	0		15
A/P module	2	4	15	0		15
Fixed Assets (Depreciation)	3	3	15	0		15
Budget Formulation module	2	4	15	0		15
Time & Attendance (with Labor)	2	4	15	0		15
Labor (after Cost Accounting)	2	4	15	0		15
Order Processing module	4	50	110	0		110
Executive Information System	4	1	10	60	30–100	100 - 170
Cash Receipts (with Order Processing)	2	10	25	0		25
Refunds (with Order Processing)	2	10	25	0		25
LONG TERM PROJECTS:						
Credit Cards	1	3	10	0		10
Subscription	1	6	15	0		15
Deposit Accounts (after A/R)	4	15	30	0	10–20	40–50
CARS	1	3	10	0		10
TOTAL:	83	237	655	145	50–140	850–940

(1) Time estimates include recommendations for outside assistance on projects as noted.

Estimates represent an order of magnitude and reflect our best estimates at the time of the study.

(2) Labor costs for all NTIS are assumed to be $50/hour

(3) Estimates for A/R are incremental form January 1991 forward.

Pay Reform and NIST:
Impact of the Federal Employees Pay Comparability Act of 1990 (11/5/90) on the Institute of Standards and Technology (NIST) Personnel Management Demonstration Project

Several of the provisions of the Pay Comparability Act will benefit NIST, but the Act does not make the NIST Personnel Management Demonstration Project obsolete. The NIST Project covers a broad array of personnel management and administrative functions, not just pay. The Project is testing innovative ideas in position classification, recruiting, qualifications examining, probation, performance appraisal, pay for performance, automation and paperwork reduction, and delegations of authority to managers.

NIST is testing a position classification system, based on career paths, broad-banding, simplified classification standards, and automated position descriptions, that has received extensive interest from other Federal agencies. This would continue to be a useful demonstration of an innovative classification system that would aid Congress and the Office of Personnel Management (OPM) in future deliberations on the need for classification reform and the direction of that reform. NIST is demonstrating a faster and more effective staffing system based on agency-based hiring, more extensive direct-hiring, and more immediate use of paid advertising. NIST uses a three-year probation period for new hires in science and engineering, which allows a supervisor to see more of the full cycle of research before making a final hiring decision.

NIST has simplified the performance appraisal system into a more direct scoring-ranking-payout process that does away with the five-rating system that many Federal employees have found objectionable and counterproductive. Through pay-for-performance, NIST links annual pay increases to performance for all white-collar workers, eliminating the automatic step increases in the GS system and, through broad-banding, making more of the pay range dependent on performance. The simplified NIST systems are more amenable to automation and reduced paperwork. For example, the automated classification system allows a supervisor to produce a classified position description in less than 15 minutes, and the automated pay-for-performance system allows the manager to enter performance scores and generate performance pay increases that are compared against pay pool ceilings and electronically transmitted to the automated payroll system. With their increased delegations of authority, NIST managers have become more effective as the personnel managers of their units.

None of these features are made obsolete by the Pay Comparability Act. The NIST Project should continue to operate as a new and innovative personnel system.

Analysis of Pay Comparability Act as it affects NIST

Provisions	Implementation	Comments
1. **Comparability Increase** in January based on BLS's Employment Cost Index (ECI)		NIST could implement this adjustment as the NIST January comparability increase.
- full ECI	1992 & 1993 (1992 increase will be 4.2%)	
- ECI minus .5 percentage points	beginning 1994	
(President may reduce increase based on national emergency or serious economic conditions)		
2. **Locality Pay** increases where local non-Federal pay is more than 5% above GS pay (all GS in area will receive same adjustment; goal is 100% comparability)	does not begin until 1994	NIST would be able to implement this increase if BLS figures support locality pay for the Washington Metro area; same percent increase would have to be given to each employee and applied to each pay band.
- increase to reduce gap by 20%	1994	
- gap reduced gradually to 5% or less	additional tenth per year beginning 1995	

3. **Geographic Adjustments** up to 8% of base pay	already authorized for NY, SF, and LA; may be authorized at any time for other areas	NIST would be able to implement this increase if it is granted to the Washington Metro area; same percent increase would have to be given to each employee and applied to each pay band.
4. **Critical Positions**, up to 800, paid up to EL-I ($138,900); scientific, technical, professional, or managerial expertise essential to mission; additional compensation needed for recruitment and retention; approved by OMB in consultation with OPM; may be paid above EL-I with Presidential approval	upon issuance of guidelines	NIST would be able to apply for these slots.
5. **Senior Level Pay** for 3104 positions ranging from 120% of 15/1 to EL-IV ($73,972-$108,300; current range is $72,298-$97,317)(also covers former GS-16/17/18 which are now banded with ST-3104s)	upon issuance of regulations; the first draft of the OPM legislation makes "supergrade" positions non-quota, but OMB is reviewing this idea.	NIST can apply these higher levels to ST-3104 positions.
6. **Staffing Differential** of 5% of base pay for certain GS-5 or higher positions	may be established by President	NIST pay bands and flexible entry salaries are better.

7. **Recruitment or Relocation Bonus** up to 25% of base pay for hard-to-fill positions (in a lump-sum)	upon issuance of regulations	the "25% of base pay" provision is more generous than the NIST $10,000 limit at ZP Band III, interval 2, and above. NIST should have access to this provision. Although NIST does not have a "relocation bonus," the retention allowance could be used for that purpose.
8. **Retention Allowance** up to 25% of base pay (added to pay check but does not count as base pay)	upon issuance of regulations	(same as above)
9. **Separate Pay Systems**	must be established by OPM for a specific group of positions	OPM staff are still debating the intent of this provision. Apparently it would allow OPM to establish permanent pay-band systems under its own authority.
10. **Supervisory Differential** for GS employees who supervise non-GS employees, such as wage grade, when at least one of the subordinates would otherwise have higher pay than the supervisor	after authorization by OPM to agency head	NIST could gain access to this provision, if needed. It is more restrictive than the NIST differentials, which cover all white-collar supervisors.
11. **Pre-Employment Interview** travel expenses for any employee	upon issuance of regulations	NIST would have this authority.

12. **First Post of Duty** travel and transportation expenses for any employee	upon issuance of regulations	NIST already has this authority for shortage category positions (all ZP). NIST could use the authority for other positions if needed.
13. **Advance Pay** for new appointees (up to two pay periods)	upon issuance of regulations	NIST would have this authority.
14. **Time Off** in lieu of cash award (no charge to leave)	upon issuance of regulations	NIST would have this authority.
15. **Special Rates** up to 30% above the normal scale	upon issuance of regulations	NIST would have the option of using any special rates established for the Washington Metro area, as is now the case.
16. **Performance Cash Awards** up to 20% of base pay	upon issuance of regulations	NIST would have access to the new provision, but it may have to be delegated by DoC.
17. **Pay for Performance** for the General Schedule	to be designed by a special committee of agency and labor representatives	this will probably be a pay-for-performance system that would overlay the GS system, so would not apply to NIST.

4/9/91

NIST Demonstration Project Successes

Specific Instances of Project successes are presented below, organized by Project interventions.

RECRUITING ALLOWANCES:

Under the Project, a recruiting allowance of up to $10,000 may be paid, in a lump sum or in increments, to candidates for hard-to-fill positions. So far, 18 recruitment allowances, averaging slightly over $5000, have been paid. The policy is that a recruitment allowance will not be paid unless it is needed to attract a well-qualified candidate; therefore, all recruitment allowances have been effectively applied. Examples are the following:

- an allowance of $6000 paid to a Ph.D. physical scientist from a private firm to take a position with the Building Materials Division. Because of his high salary at the firm and because of the high cost of housing in Montgomery County, the cash bonus was essential and effective. (ZP-1301-4)
- an allowance of $2000 granted by the Ionizing Radiation Division was instrumental in attracting one of the few black Ph.D. physicists to enter the job market in 1988. (ZP-1320-3)
- The Electronics Technology Division used a recruiting allowance of $10,000 to attract a Ph.D. electronics engineer for the Lightwave initiative. (ZP-855-3)

FLEXIBLE ENTRY SALARIES OF PAY BANDING:

Under the Project pay band system, an entry salary for a new hire may be set anywhere in the entry pay band, which also offers a broader range of pay than grades. This flexibility allows managers to negotiate more effectively with highly qualified candidates and compete more successfully in the market. Under the former system, entry salaries had to be set at step 1 of the entry grade and could be set at a higher step only after approval by OPM. Examples of the successful application of flexible entry salaries are the following:

- three Ph.D. mathematical statisticians hired by the Computing and Applied Mathematics Laboratory after a national search in a highly competitive market. The flexible entry pay of pay banding allowed the Laboratory to compete successfully against DuPont in one hire, against General Motors Research in another hire, and against a west coast environmental studies office in the third. (ZP-1529-III/IV)

- a Ph.D. mechanical engineer who graduated from the California Institute of Technology received an offer from a private firm higher than the initial offer made by the NIST Fire Suppression Group. With the flexible entry pay authority, NIST was able to raise the offer to a level acceptable to the candidate. (ZP-830-4)

- a female M.A. fire prevention engineer was hired into the Fire Measurement and Research Division with the help of flexible entry pay. (ZP-804-3)

- the perennial problem in finding an adequate number of security guards was alleviated by flexible entry salaries, and during the war with Iraq, when security at federal agencies was suddenly increased, flexible entry salaries were essential in hiring temporary guards.

- a computer scientist was hired into the Fire Measurement and Research Division with the help of flexible entry pay. (ZP-1550-2)

- an engineering technician with an associate degree from Capitol College was hired into the Fire Science and Engineering Division with the help of flexible entry pay. (ZT-802-2)

- a physical scientist and a physicist with scarce technical specialties hired into the Asbestos Analysis Project with the help of higher-than-minimum entry salaries. (ZP-1301-3; ZP-1320-2)

- a leading biologist retiring early from Ciba Corning with 35 patents and over 100 publications hired into the Biotechnology Division. Flexible entry pay enabled the Division to compete successfully against other offers. (ZP-401-5)

- a computer scientist was hired into the Computer Security Division after the flexible entry pay allowed the hiring official to better an offer from the private sector. (ZP-1550-3)

- a female Ph.D. computer specialist was hired into the Information Systems Engineering Division with the help of a higher-than-minimum entry salary. (ZP-334-5)

- a Ph.D. theoretician in chemistry was recruited and hired by the Molecular Theory Group of the Molecular Physics Division with the help of flexible entry salary. (ZP-1320-3)

- two Ph.D. physicists with unusual backgrounds in precision measurement were recruited quickly to fill urgent needs in the

Quantum Metrology Division with the help of negotiated entry salaries. (ZP-1310-3)

- flexible entry salary helped the Ionizing Radiation Division hire one of the few black Ph.D. physicists to enter the job market in 1988. (ZP-1320-3)
- with higher-than-minimum salaries, the Plant Division was able to fill an electrical engineering position, which had been vacant for years, and a mechanical engineering position. (ZP-850-3; ZP-830-2)
- the Ceramics Division cited flexible entry pay as a critical factor in hiring a female Ph. D. materials research engineer and a Ph.D. research chemist with scarce qualifications in solid state nuclear magnetic resonance analysis. (ZP-806-4; ZP-1320-4)
- after a year of searching for a chemical engineer with experience in molding of composite materials, the Polymers Division was able to hire a Ph.D. chemical engineer by offering $47,000 ($7,000 more than under the prior system) to successfully compete against a $52,000 offer from the private sector. (ZP-893-4)
- the Electricity Division used negotiable entry salaries to hire seven recent B.S. and Ph.D. graduates in electrical engineering and physics.
- the Semiconductor Electronics Division cited flexible entry pay as the critical factor in filling a supervisory position with a Ph.D. physicist recruited from a university position. (ZP-1310-5)
- the Electromagnetic Fields Division used negotiated entry salaries make four significant hires: (1) two outstanding new graduates in engineering; (2) a highly qualified Ph.D. electronics engineer recruited from the Ball Corporation; (3) an M.S. electronics engineer who had several good offers from the private sector; (4) a uniquely qualified Ph.D. physicist employed by Delft University in the Netherlands.
- The Electromagnetic Technology Division cited flexible entry pay in successfully recruiting a Ph.D. electronics engineer and two Ph.D. physicists for the Lightwave initiative. (ZP-855-3; ZP-1310-4; ZP-1310-4)

AGENCY-BASED HIRING

An issue before the project was that NIST had to go through OPM registers before filling a position, unless the position was an engineering or higher-level physicist position that qualified for direct-hire. This led to three problems: (1) time delay; (2) the lack of qualified candidates on OPM registers; and (3) blocked registers, preventing the filling of a position by name request with a highly-qualified candidate discovered by NIST.

Agency-based hiring gives NIST authority to establish its own registers, rather than having to go through OPM registers. This saves time, even when the action does not qualify for the direct-hire method. Under the agency-based process, NIST personnelists examine qualifications and rate and rank candidates just as OPM examiners do, but NIST can complete the process quicker.

An example of the successful application of the agency-based process is the following:

- a female Ph.D. computer specialist and a female mathematician hired into the Computing and Applied Mathematics Laboratory; without agency-based hiring, these appointments would have been prevented by blocked registers. (ZP-334-4; ZP-1520-2)

DIRECT-HIRING:

NIST has expanded the direct-hiring process under the project by justifying the use of direct-hire for any hard-to-fill scientific or engineering position or any position in an occupation for which OPM pays a "special rate." Direct-hire allows NIST to fill a position with a qualified candidate without going through the formal posting and competitive process. NIST may choose to post the position and conduct an intensive search for candidates, but when a good candidate is found the candidate may be hired immediately. Examples are the following:

- three Ph.D. mathematical statisticians hired by the Computing and Applied Mathematics Laboratory after a national search in a highly competitive market. As soon as each candidate was found, an immediate offer was made and the candidate was hired within the time window established by the candidate. (ZP-1529-III/IV)
- a physical scientist and a physicist with scarce technical specialties hired into the Asbestos Analysis Project, with an estimated savings of three months in hiring, at a time when these specialties were needed to fulfill NIST's responsibilities under the Asbestos Hazards Emergency Response Act. (ZP-1301-3; ZP-1320-2)

- a leading biologist retiring early from Ciba Corning with 35 patents and over 100 publications hired into the Biotechnology Division. Direct-hire enabled the Division to act quickly before the candidate accepted a competing offer.
- two Ph.D. physicists with unusual backgrounds in precision measurement were recruited quickly to fill urgent needs in the Quantum Metrology Division with the help of direct-hire methods. (ZP-1310-3)
- the speed of direct hiring helped the Ionizing Radiation Division hire one of the few black Ph.D. physicists to enter the job market in 1988. (ZP-1320-3)
- direct-hire was cited by the Time and Frequency Division as the tool that allowed them to hire an electronics engineer who had other offers. (ZP-855-3)
- two accountants and an accounting technician were direct-hired into the Office of the Comptroller. (ZA-510-2; ZA-510-2; ZA-525-4)
- the Ceramics Division cited direct hire as a critical factor in hiring a female Ph. D. materials research engineer and a Ph.D. research chemist with scarce qualifications in solid state nuclear magnetic resonance analysis. (ZP-806-4; ZP-1320-4)
- after a year of searching for a chemical engineer with experience in molding of composite materials, the Polymers Division was able to hire a Ph.D. chemical engineer through the help of direct hire. (ZP-893-4)
- the Electromagnetic Technology Division cited direct hire as instrumental in recruiting three Ph.D. physicists, one of whom was female, and an M.S. physicist. (ZP-1310-3/4)

PAID ADVERTISING

Before the project it was necessary to demonstrate that unpaid methods were not successful in attracting candidates before paid advertising could be used. This requirement often delayed filling a position for which paid methods were necessary to reach the most productive sources. Under the project, paid advertising may be used at the very beginning of the recruitment effort.

Many of the scientific and engineering hires cited under "flexible entry salaries" and "direct hiring" were facilitated by paid advertising. Other examples are the following:

- a B.S. in business management was attracted through a paid advertisement to fill an accountant position in the Office of the Comptroller. (ZA-510-2)

- a highly qualified candidate with a B.A. in business management was attracted to a vacant supervisory printing specialist position through a paid advertisement. (ZA-1654-3)

MORE FLEXIBLE PAY FOR CURRENT EMPLOYEES THROUGH PAY BANDING AND PAY-FOR-PERFORMANCE

To improve the organization's ability to retain top performers and employees with vital and scarce skills, the project provides several tools:

1. Annual performance increases. In the General Schedule system, an employee in the mid or upper range of a grade could get a step increase only once every two or three years, respectively. Under the project, which replaced steps with pay-for -performance, each covered employee is eligible for an increase every year.

2. Higher potential performance increases. In a pay band system, the performance pool is augmented by money previously spent on promotions from one grade to the next higher grade, where both grades are now in the same pay band. This money, along with previous step increase, quality increase, and PMRS increase money, provides more generous salary increases for top performers.

3. Potential for quicker promotions. In the former General Schedule system, an employee was required to spend at least one year in grade for promotion eligibility. In the project system, an employee must spend at least one year in a pay band for promotion eligibility. Because each band below the highest band covers at least two grades, promotions are potentially more rapid.

4. Higher potential pay increases upon promotion. In the previous system, the required pay increase upon promotion was the equivalent of two step increases in the general workforce (about 6%) and 6 percent in the PMRS system. Under the project, the required pay increase upon promotion is 6 percent minimum, with no maximum (short of the maximum rate of the new band).

Examples of the application of these tools are the following:

- the Systems and Software Technology Division was able to retain an outstanding computer scientist through the higher promotion and performance pay increases allowed by the project. (ZP-1550-3)

- the Quantum Physics Division cited the potential for more-rapid salary increases as the reason they were able to retain the minority supply specialist who was experienced in using both the NIST and University of Colorado procurement and administrative systems to manage the JILA facility. (ZA-2001-2)
- the Reactor Radiation Division has used the more flexible pay features to more effectively retain reactor operators through salaries more comparable to those at other research and commercial reactors. (ZT-802)
- the Polymers Division was able to retain a highly qualified Ph.D. chemical engineer with critical and highly marketable skills through the higher pay increases available for outstanding performers. (ZT-893-3)
- the Electromagnetic Fields Division used the potential for more generous salary increases for top performers to retain a Ph.D. physicist who has made major contributions to the organization. (ZP-1310-4)

NIST PERSONNEL MANAGEMENT DEMONSTRATION PROJECT

The NIST Authorization Act for Fiscal Year 1987 provided for a five-year project to demonstrate an alternative personnel management system, which was implemented January 1, 1988. It is built on the concepts of total compensation comparability, market sensitivity, pay for performance, administrative simplicity, management flexibility, and government-wide applicability. It is designed to improve hiring and retention of high-quality personnel and to more effectively compensate and retain high performers.

INTERVENTIONS:

- Pay
- Position Classification
- Recruitment
- Examining
- Retention
- Performance Management

IMPLEMENTATION: implemented January 1, 1988

DURATION: 5 years, unless extended

COST: budget neutral

CONCEPTS: total compensation comparability, market sensitivity, pay for performance, administrative simplicity, management flexibility, and government-wide applicability.

OBJECTIVES: recruit and retain quality staff; make compensation more competitive; link pay to performance; simplify position classification; streamline processing; improve the staffing process and get new hires aboard faster; increase manager's role and accountability in personnel management; make the system transportable to other agencies.

COVERAGE: all Gaithersburg and Boulder employees, except wage-grade employees and the NIST Director, are covered by the legislation; SES and ST-3104 positions are not affected by project interventions.

BASIC SYSTEM FEATURES: (1) allows NIST to compete more effectively in the labor market through agency-based hiring and expanded direct-hiring, greater management involvement in recruiting and hiring, flexible entry salaries, recruiting allowances, and greater use of paid advertising; (2) allows NIST to more effectively compensate and retain good performers through pay for performance, higher pay potential of pay banding, supervisory differentials, and retention allowances; (3) more effective and efficient project personnel system, through delegation of authority and accountability to managers, pay banding, simplified classification, and automation of personnel processes; (4) annual compensation comparability study of the private sector, based on "total compensation," rather than on pay only ("total compensation" is defined, for purposes of the NIST project, as basic pay, bonuses, allowances, retirement, health insurance, life insurance, and leave benefits).

ACCOMPLISHMENTS: NIST experience in operating the demonstration system shows the following:

- Faster classification and hiring
- More effective hiring
- Greater pay flexibility, particularly at entry level
- Good performers better rewarded

Attachment 1
External Evaluation

1. The OPM contractor Implementation Report (August 1989) stated that:

   - "Demonstration Project based changes to the NIST personnel system were generally implemented in a timely fashion...."

   - "The most favorable reaction to the Demonstration Project related to changes in recruitment and hiring practices."

   - "Most focus group employees are not satisfied with the performance appraisal process...." [The performance appraisal process has since been revised, largely in response to managerial and employee comments.]

2. The OPM contractor Second Annual Evaluation Report (August 1990) stated that:

   - NIST has accomplished most short term Project objectives.

   - NIST has succeeded in improving the efficiency of a variety of personnel actions, most notably those associated with staffing and hiring.

   - During each of the past two years, NIST has met its goal of implementing the Demonstration Project in a budget neutral manner.

   - NIST has extensively used its expanded direct hire authority during the first two years of the Demonstration Project. Direct hiring has been used to fill approximately 75% of the vacancies during this period.

   - Through the use of direct hire and agency-based hiring, NIST has reduced the time required to fill position vacancies.

   - NIST has been successful in linking pay increases to performance.

   - The Demonstration Project pay-for-performance system has significantly altered the distribution of salary increases at NIST. Within NIST, mean salary increases exhibit a strong relationship to performance rating categories.

- NIST employees registered discontent with the summary rating levels . . . . A new performance appraisal system is planned for implementation in the 1990-91 performance cycle. [The new system has since been implemented, substituting a two-level rating system for the former five-level rating system.]

3. The Second Annual Evaluation Report included the results of a 1989 general survey of covered employees. Many of the items on the 1989 survey repeated items from a 1987 "baseline" survey based on the personnel system that existed prior to implementation of the Project. The results showed that:

a. Supervisors appear to strongly prefer the Project system over the former system. Of the thirteen items on the 1987 and 1989 surveys that were for supervisors only, ten items were more positive in 1989, one item was more negative in 1989, and two items did not significantly change.

b. The supervisory items were as follows:

(A/SA--Agree/Strongly Agree; U--Undecided;
D/SD--Disagree/Strongly Disagree)

		A/SA	U	D/SD
I have the authority to establish the positions I need to get the work done.	87	41.1%	10.4%	48.5%
	89	41.9%	14.5%	43.6%
I have enough authority to promote people.	87	45.0%	13.4%	41.7%
	89	48.5%	13.0%	38.5%
I have enough authority to determine my employees' pay.	87	18.1%	13.1%	68.9%
	89	37.6%	17.0%	45.5%
Top management generally supports the personnel decisions made by supervisors.	87	63.9%	17.0%	19.1%
	89	59.8%	20.8%	19.3%
Supervisor's here feel their ability to manage is restricted by unnecessary personnel rules and regulations.	87	73.6%	13.1%	13.4%
	89	49.7%	27.9%	22.4%
I have enough authority to influence classification decisions.	87	35.6%	21.7%	42.7%
	89	52.7%	22.1%	25.1%
Much of my personnel paperwork is unnecessary.	87	46.6%	20.8%	32.6%
	89	36.8%	31.6%	31.6%

		A/SA	U	D/SD
It takes too long to process the paperwork needed to fill vacancies here	87 89	70.3% 38.8%	14.4% 23.0%	15.3% 38.1%
DoC [NBS] recognizes supervisors who take the time to develop their subordinates knowledges, skills, and abilities	87 89	29.9% 30.7%	22.9% 30.7%	47.1% 38.6%
I have to devote too much time to position classification.	87 89	27.9% 9.1%	18.6% 20.6%	53.6% 70.3%
The personnel office in this organization helps me perform my job effectively.	87 89	42.0% 44.5%	24.3% 26.7%	33.8% 28.8%
The process for getting a position description approved tends to be an adversarial process.	87 89	40.4% 18.1%	20.7% 26.0%	38.9% 55.9%
Negotiating over job classification has delayed the hiring process in my unit.	87 89	51.7% 18.4%	16.9% 28.7%	31.4% 52.8%

c. Major items presented to all covered employees were:

	A/SA	U	D/SD
I am in favor of the demonstration project.	47.2%	32.1%	17.8%
Under the demonstration project, I don't have to become a supervisor to receive more pay.	47.7%	23.8%	18.8%
Pay banding permits a better match between my salary and level of competency than did the GS grading system.	33.4%	33.5%	26.5%
In general, I like working here.	89.7%	5.8%	4.5%
Overall, I am more satisfied with my job under the new system than under the old system.	31.0%	36.4%	24.7%
My job is challenging	79.7%	8.9%	11.4%
The work I do on my job is meaningful to me	83.9%	8.1%	7.9%

4. An OPM team conducted a thorough assessment of the Project candidate evaluation system and found that:

> overall, the examining portion of NIST's Demonstration Project is very well organized, and operates smoothly and effectively. Actions taken are in conformance with merit system principles and with the legislation authorizing the Demonstration Project.

5. The dissatisfactions expressed by employees in focus groups and through the general survey related predominantly to performance appraisal. NIST worked with OPM to change the performance system in ways suggested by employees and managers. A proposed new system was published in the Federal Register May 10, 1990, followed by a final notice published September 25, 1990. The new system will be used for the FY 1991 performance cycle.

Attachment 2
Internal Evaluation

Specific Instances of Project successes are presented below, organized by Project interventions.

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- a female Ph.D. computer specialist and a female mathematician hired into the Computing and Applied Mathematics Laboratory; without agency-based hiring, these appointments would have been prevented by blocked registers. (ZP-334-4; ZP-1520-2)

DIRECT-HIRING:

NIST has expanded the direct-hiring process under the project by justifying the use of direct-hire for any hard-to-fill scientific or engineering position or any position in an occupation for which OPM pays a "special rate." Direct-hire allows NIST to fill a position with a qualified candidate without going through the formal posting and competitive process. NIST may choose to post the position and conduct an intensive search for candidates, but when a good candidate is found the candidate may be hired immediately. Examples are the following:

- three Ph.D. mathematical statisticians hired by the Computing and Applied Mathematics Laboratory after a national search in a highly competitive market. As soon as each candidate was found, an immediate offer was made and the candidate was hired within the time window established by the candidate. (ZP-1529-III/IV)

- a physical scientist and a physicist with scarce technical specialties hired into the Asbestos Analysis Project, with an estimated savings of three months in hiring, at a time when these specialties were needed to fulfill NIST's responsibilities under the Asbestos Hazards Emergency Response Act. (ZP-1301-3; ZP-1320-2)

- a leading biologist retiring early from Ciba Corning with 35 patents and over 100 publications hired into the Biotechnology Division. Direct-hire enabled the Division to act quickly before the candidate accepted a competing offer.

- two Ph.D. physicists with unusual backgrounds in precision measurement were recruited quickly to fill urgent needs in the Quantum Metrology Division with the help of direct-hire methods. (ZP-1310-3)

- the speed of direct hiring helped the Ionizing Radiation Division hire one of the few black Ph.D. physicists to enter the job market in 1988. (ZP-1320-3)
- direct-hire was cited by the Time and Frequency Division as the tool that allowed them to hire an electronics engineer who had other offers. (ZP-855-3)
- two accountants and an accounting technician were direct-hired into the Office of the Comptroller. (ZA-510-2; ZA-510-2; ZA-525-4)
- the Ceramics Division cited direct hire as a critical factor in hiring a female Ph. D. materials research engineer and a Ph.D. research chemist with scarce qualifications in solid state nuclear magnetic resonance analysis. (ZP-806-4; ZP-1320-4)
- after a year of searching for a chemical engineer with experience in molding of composite materials, the Polymers Division was able to hire a Ph.D. chemical engineer through the help of direct hire. (ZP-893-4)
- the Electromagnetic Technology Division cited direct hire as instrumental in recruiting three Ph.D. physicists, one of whom was female, and an M.S. physicist. (ZP-1310-3/4)

PAID ADVERTISING

Before the project it was necessary to demonstrate that unpaid methods were not successful in attracting candidates before paid advertising could be used. This requirement often delayed filling a position for which paid methods were necessary to reach the most productive sources. Under the project, paid advertising may be used at the very beginning of the recruitment effort.

Many of the scientific and engineering hires cited under "flexible entry salaries" and "direct hiring" were facilitated by paid advertising. Other examples are the following:

- a B.S. in business management was attracted through a paid advertisement to fill an accountant position in the Office of the Comptroller. (ZA-510-2)
- a highly qualified candidate with a B.A. in business management was attracted to a vacant supervisory printing specialist position through a paid advertisement. (ZA-1654-3)

MORE FLEXIBLE PAY FOR CURRENT EMPLOYEES THROUGH PAY BANDING AND PAY-FOR-PERFORMANCE

To improve the organization's ability to retain top performers and employees with vital and scarce skills, the project provides several tools:

1. Annual performance increases. In the General Schedule system, an employee in the mid or upper range of a grade could get a step increase only once every two or three years, respectively. Under the project, which replaced steps with pay-for -performance, each covered employee is eligible for an increase every year.

2. Higher potential performance increases. In a pay band system, the performance pool is augmented by money previously spent on promotions from one grade to the next higher grade, where both grades are now in the same pay band. This money, along with previous step increase, quality increase, and PMRS increase money, provides more generous salary increases for top performers.

3. Potential for quicker promotions. In the former General Schedule system, an employee was required to spend at least one year in grade for promotion eligibility. In the project system, an employee must spend at least one year in a pay band for promotion eligibility. Because each band below the highest band covers at least two grades, promotions are potentially more rapid.

4. Higher potential pay increases upon promotion. In the previous system, the required pay increase upon promotion was the equivalent of two step increases in the general workforce (about 6%) and 6 percent in the PMRS system. Under the project, the required pay increase upon promotion is 6 percent minimum, with no maximum (short of the maximum rate of the new band).

Examples of the application of these tools are the following:

- the Systems and Software Technology Division was able to retain an outstanding computer scientist through the higher promotion and performance pay increases allowed by the project. (ZP-1550-3)

- the Quantum Physics Division cited the potential for more-rapid salary increases as the reason they were able to retain the minority supply specialist who was experienced in using both the NIST and University of Colorado procurement and administrative systems to manage the JILA facility. (ZA-2001-2)

- the Reactor Radiation Division has used the more flexible pay features to more effectively retain reactor operators through salaries more comparable to those at other research and commercial reactors. (ZT-802)

- the Polymers Division was able to retain a highly qualified Ph.D. chemical engineer with critical and highly marketable skills through the higher pay increases available for outstanding performers. (ZT-893-3)

- the Electromagnetic Fields Division used the potential for more generous salary increases for top performers to retain a Ph.D. physicist who has made major contributions to the organization. (ZP-1310-4)

Attachment #3
Staffing Problems Prior to Demonstration Project

The following is a sampling of hiring and retention problems experienced by the National Institute of Standards and Technology (NIST) prior to the NIST Personnel Management Demonstration Project implemented January 1988. These experiences were collected from NIST managers in October 1987.

- in the last three years, ten scientists in the Center for Analytical Chemistry who left for higher paying positions in the private sector. For these ten positions, the private sector positions paid an average of $11,143 above the NBS positions.

- seven recent failures in the Radiation Physics Division to recruit new Ph.D.'s or postdocs because of higher private sector offers that averaged $14,800 above NBS offers.

- in efforts by the Ceramics Division over the last two years to find good candidates, eight new Ph.D. graduates who rejected NBS offers at the GS-12 level to accept private sector positions with salaries in the $45,000 to $50,000 range; two new M.S. graduates who rejected NBS offers for industry offers 30 percent higher; and senior Ph.D. scientists with needed experience who were found to be receiving industry salaries of $80,000 plus.

- two postdocs who left the Ceramics Division at the end of one year to accept private sector offers of about $50,000.

- a new Ph.D. graduate who left his $26,400 position in the Organic Analytical Research Division after 10 months to accept an industry position at $44,000.

- many other cases of new Ph.D. graduates recruited by NBS who accepted private sector positions at salaries $7,500 to $16,000 more than NBS could offer.

- many other cases of new Ph.D.'s who did postdoc work at NBS, but would not take permanent positions at the salaries NBS could offer.

- a GS-12 Physicist with two years of experience who left the Radiation Physics Division for an industry position at a GS-15 level salary.

- a new Ph.D. in materials research engineering who rejected the best offer from the Fracture and Deformation Division to accept an industry offer 45 percent higher.

- an effort by the Electricity Division to hire graduates of a particular two-year community college program into GS-4 technician positions that had to be terminated when the Division found that several private sector companies were offering these graduates salaries from 40 to 55 percent above the best offer NBS could make.

- a scientist who, at the end of a two-year postdoc appointment at NBS, left for a private sector position at a GS-15 level salary.

- several instances of the Radiation Source and Instrumentation Division losing technician candidates to private sector technician positions paying up to $7,000 more than the best NBS offer.

- a new Physics graduate who was offered a position in the Temperature and Pressure Division at $25,000, but showed NBS a competing industry offer for $35,000; while NBS was asking OPM permission to offer a higher rate, the candidate accepted another industry offer at $40,000.

- an NBS technician who was promoted as fast as the Federal system allows, but left for a private sector position with a 50 percent increase in pay.

- two NBS group leaders from the same division, one at GS-14 and the other at GS-15, who took private sector positions at salaries of $75,000 each.

- a young NBS Ph.D. in superconductors who left for a university position at $75,000 plus summer salary.

- a young NBS surface scientist who left after receiving three offers higher than NBS could pay.

- no candidates were found for an electrical engineering position advertised at GS-7/9, because the new B.S. engineering graduates sought were receiving $6,000 to $10,000 more for starting positions in the private sector.

- a new Ph.D. graduate in electronics engineering who rejected the NBS offer of GS-12 salary to accept a private sector position at $48,000.

- an M.S. in electronics engineering with 11 years experience who rejected an NBS offer of $48,000 to accept a private sector position at $60,000.

- an NBS coop student with a B.S. in computer science who rejected an NBS offer of $24,248 to accept a private sector position at $32,000.

- a new B.S. in computer science who rejected an NBS offer to accept a private sector position $10,000 higher.

- an experienced Ceramics Division scientist with an M.S. who left for a private sector offer 40 percent above his NBS salary.

- a graduating Chemist who rejected an offer of $26,000 in the Inorganic Chemistry Division to accept a private sector offer of $40,000.

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MARKUP OF PENDING LEGISLATION

WEDNESDAY, APRIL 10, 1991

U.S. House of Representatives

Subcommittee on Technology and Competitiveness

Committee on Science, Space, and Technology

Washington, D.C.

The subcommittee met, pursuant to notice, at 11:44 a.m. in room 2318, Rayburn House Office Building, Hon. Tim Valentine [chairman of the subcommittee] presiding.

Our final bill is the current version of the American Technology Preeminence Act of 1990. The Subcommittee on Technology and Competitiveness held two days of hearings in February of this year on this proposed legislation, thereby updating a series of 15 hearings which were held over the last two years by the committee on the status of U.S. competitiveness.

This bill came very close to becoming law during the last Congress. After months of negotiations, final agreement was reached between the bipartisan leadership of the House Committee on Science, Space, and Technology and the Senate Committee on Commerce, Science, and Transportation.

This year's bill is very similar to last year's agreement. Most changes in the bill are not substantive, but are required by the passage of time or to conform with an administrative reorganization of the National Institute of Standards and Technology.

The bill before you authorizes appropriations for the

Department of Commerce Technology Administration programs, including the National Institute of Standards and Technology, for fiscal years 1991 and 1992. The authorization levels, totaling $289,728,000 for fiscal year 1991 and $347,500,000 for fiscal year 1992, are consistent with last year's agreement.

I am pleased that the Administration has proposed doubling NIST's in-house research budget over the next five years, given its major responsibility for support of the country's industrial base and in view of the fact that NIST's budget experienced a long decline in terms of real dollars during much of the 1970s and 1980s.

This bill also provides for reasonable growth in NIST's Extramural Program, which is so important for our competitiveness effort. The Advanced Technology Program is authorized at $100 million, the level this committee originally approved for fiscal year 1990. Other effective outreach programs, such as the State Technology Extension Program and the Non-Energy Related Inventions Program, are level-funded; and funding for the Regional Manufacturing Centers is expanded to permit the establishment of two additional centers.

The subcommittee draft also authorizes $9 million for the Office of the Under Secretary for Technology for fiscal year 1992.

Other provisions of the bill include the establishment of commissions to recommend changes to lower the cost of capital in developing technologies and in Government purchasing law; the authorization of studies to address technology policy issues; a provision extending the life of the National Advisory Committee on Semiconductors; and recommended language and technical changes to conform the bill to present public law. A brief title-by-title summary has been provided for your information.

[The subcommittee print follows:]

********** INSERT **********

COMPETITIVENESS BILL SUMMARY

AMERICAN TECHNOLOGY PREEMINENCE ACT OF 1991

Title I. This title authorizes each of the programs of the Technology Administration. For the activities of the Office of the Under Secretary For Technology, $6.5 million is authorized for FY 1991, which includes $1.3 million for the Office of the Under Secretary, $2.7 million for Technology Policy, $1.0 million for Japanese Technical Literature, $1.0 million for the Clearinghouse on State and Local Initiatives and $500,000 for the modernization of the National Technical Information Service. For FY 1992, $9.0 million is authorized which includes, $1.6 million for the Office of the Under Secretary, $3.4 million for Technology Policy, $1.5 million for Japanese Technical Literature, $1.0 million for the Clearinghouse on State and Local Initiatives, and $1.5 million is provided for the modernization of the National Technical Information Service. For the National Institute of Standards and Technology (NIST), the authorization levels for the intramural scientific and technical research and services activities are $166.2 million for FY 1991 and $211 million for FY 1992, and for the extramural industrial technology services program, $117 million for FY 1991 and $127.5 million for FY 1992, which includes $15 million in FY 1991 and $25 million in FY 1992 for Regional Centers for the Transfer of Manufacturing Technology with the assumption that new centers will be started each of the two fiscal years; $2 million in FY 1991 and $2.5 million in FY 1992 is provided for the State Technology Extension Program; and $100 million is authorized for each of the 1991 and 1992 fiscal years for the Advanced Technology Program. This title also provides start-up matching finds for a program to place U.S. standards experts in developing nations to make sure that those nation's standards codes permit the marketing of U.S.-designed products. The fire research and building technology programs are combined for administrative purposes only, with separate budget accounts to be maintained, and a report on the results of the combination is required. A provision authorizing NIST and the Federal Aviation Administration to undertake a joint research program to develop an all-fire resistant aircraft cabin interior has been added. The NIST Organic Act is amended to provide NIST with authority to manage its scientific and technical fellowship programs and to recruit and employ highly qualified foreign nationals who have advanced degrees from U.S. universities and have filed to become U.S. citizens. The National Advisory Commission on Semiconductors is extended through FY 1992.

Title II. This title is cited as the "Emerging Technologies and Advanced Technology Program Amendments Act of 1991 and provides statutory language for assistance to solve generic technology and manufacturing problems in emerging technology fields including high resolution information systems and advanced materials research and development, but specific spending levels are not designated for specific technologies. Conditions under which a company can participate in the Advanced Technology Program are set out. A comprehensive report is required 4 years after enactment of the law of the activities of the Advanced Technology Program.

Title III. This title makes the funding for the Federal Laboratory Consortium permanent, extends federal patent law to the legislative branch, and authorizes appropriated funds to carry out administrative responsibililties under the Malcolm Baldrige Quality Improvement Act.

Title IV. A Presidential Commission on Reducing Capital Costs for Emerging Technology is established to develop legislative recommendations to increase the competitiveness of U.S. industry by encouraging investment in quality, product and process improvements, and new product development and marketing. A report to the President and the Congress is required one year after enactment of the Act.

Title V. This title establishes a High Resolution Information Systems Board within the Office of Science and Technology Policy to increase the cooperation of Government and industry in high resolution information systems. This title strengthens the biennial OSTP report which identifies critical civilian technologies which will be important to the U.S. economy during ten years following the report. It also requires reports on quality, on competitive research, on international standards, and on coordination of high resolution information system purchases by the Government. A Commission on Research, Development, Technology Utilization, and Government Procurement Policy, which will make recommendations on how to change governmental purchasing law and procedures to ensure that emerging technologies are encouraged through these purchases, is established. This title also requires the Department of Commerce to study the feasibility of creating a Federal On-line Information Product Catalog to be an authoritative register of governmental information products and services disseminated by the Federal government and to assist agencies and the public in locating Federal government information. The National Academies are asked to undertake a review of U.S. activities related to testing and certification of products made for export.

Title VI. This title requires NIST to implement a voluntary accreditation program to be used in the evaluation and

detection of lead in paint films, soil and dust, and to establish performance criteria and standards for lead paint encapsulants and strippers within 2 years of enactment of this Act.

BUDGET SUMMARY: TECHNOLOGY ADMINISTRATION AUTHORIZATION
(In Thousands of Dollars)

Budget Activity		Administration		Subcommittee	
	FY 1990 APPROP.	FY 1991 APPROP.	FY 1992 REQUEST	FY 1991 AUTH.	FY 1992 AUTH.
NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST)					
Intramural Program					
(Scientific & Technical Research & Services)					
Electronics & electrical engineering	16,197	21,273	33,595	21,273	34,000
Manufacturing engineering	6,233	8,266	12,617	8,266	13,500
Chemical science and technology	16,914	18,617	20,822	18,617	22,000
Physics	24,752	25,522	26,475	25,522	27,000
Materials science & engineering	23,157	26,495	28,671	26,495	30,000
Building & fire research	11,271	9,821	10,632	9,821	12,300
Computer systems	9,440	11,819	15,048	11,819	16,000
Applied math & scientific computing	5,599	5,847	6,088	5,847	6,500
Technology assistance	7,379	8,978	10,094	8,978	11,000
Research support activities	24,306	29,590	37,798	29,590	38,700
SUBTOTAL	145,248	166,228	201,840	166,228	211,000
Extramural Program					
(Industrial Technology Services)					
Advanced Technology Program	9,892	35,900	35,900	100,000	100,000
Manufacturing Technology Centers	7,419	11,900	10,300	15,000	25,000
State Technology Extension Program	1,286	1,300	0	2,000	2,500
SUBTOTAL	18,597	49,100	46,200	117,000	127,500
TOTAL NIST APPROPRIATIONS	163,845	215,328	248,040	283,228	338,500
Other Technology Admin.Programs:					
Office, Under Secretary Technology	3,297	3,500	4,236	4,000	5,000
Japanese Technical Literature Prog.	328	400	400	1,000	1,500
Clearinghouse on Productivity, Technology and Innovation	250	300	300	1,000	1,000
National Technical Information Service	0	0	0	500	1,500
NIST (from above)	163,845	215,328	248,040	283,228	338,500
GRAND TOTAL	167,720	219,528	252,976	289,728	347,500

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102D CONGRESS
1ST SESSION

H. R. ___

IN THE HOUSE OF REPRESENTATIVES

Mr. VALENTINE introduced the following bill; which was referred to the Committee on ______________

A BILL

To enhance the position of United States industry through application of the results of Federal research and development, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. SHORT TITLE.

This Act may be cited as the ``American Technology Preeminence Act of 1991''.

TITLE I--DEPARTMENT OF COMMERCE RESEARCH AND TECHNOLOGY

SEC. 101. SHORT TITLE.

This title may be cited as the ``Technology Administration Authorization Act of 1991''.

SEC. 102. STATEMENT OF POLICY.

Congress finds that in order to help United States industries to speed the development of new products and processes so as to maintain the economic competitiveness of the Nation, it is necessary to strengthen the programs and activities of the Department of Commerce's Technology Administration and National Institute of Standards and Technology.

SEC. 103. TECHNOLOGY ADMINISTRATION.

(a) FISCAL YEAR 1991.--There are authorized to be appropriated to the Secretary of Commerce (hereafter in this Act referred to as the ``Secretary''), to carry out the activities of the Under Secretary for Technology (hereafter in this Act referred to as the ``Under Secretary'') and the Assistant Secretary for Technology Policy, $6,500,000 for fiscal year 1991, which shall be available for the following line items:

(1) Office of the Under Secretary, $1,300,000.

(2) Technology Policy, $2,700,000.

(3) Japanese Technical Literature, $1,000,000.

(4) Clearinghouse on State and Local Initiatives on Productivity, Technology, and Innovation, $1,000,000.

(5) National Technical Information Service, $500,000 to carry out the modernization plan described in section 212(f)(3)(D) of the National Technical Information Act of 1988 (15 U.S.C. 3704b(f)(3)(D)).

(b) FISCAL YEAR 1992.--There are authorized to be appropriated to the Secretary, to carry out the activities of the Under Secretary and the Assistant Secretary for Technology Policy, $9,000,000 for fiscal year 1992, which shall be available for the following line items:

(1) Office of the Under Secretary, $1,600,000.

(2) Technology Policy, $3,400,000.

(3) Japanese Technical Literature, $1,500,000.

(4) Clearinghouse on State and Local Initiatives on Productivity, Technology, and Innovation, $1,000,000.

(5) National Technical Information Service, $1,500,000 to carry out the modernization plan described in section 212(f)(3)(D) of the National Technical Information Act of 1988 (15 U.S.C. 3704b(f)(3)(D)).

(c) OPERATING COSTS.--Operating costs for the National Technical Information Service associated with the acquisition, processing, storage, bibliographic control, and archiving of information and documents shall be recovered primarily through the collection of fees.

(d) REPORT AND CERTIFICATION TO CONGRESS.--Within 90 days after the date of enactment of this Act, the Secretary of Commerce shall submit to Congress a report which--

(1) describes the Department of Commerce's response to the Inspector General's Report No. ATD-024-0-001;

(2) includes a revised detailed modernization plan for the National Technical Information Service;

(3) contains a business plan for the National Technical Information Service which includes detailed profit and loss analysis for groups of products and services and for major market segments; and

(4) certifies that the National Technical Information Service has--

(A) employed a chief financial officer who is a certified public accountant with experience in the dissemination of scientific and technical information; and

(B) begun taking reasonable steps toward strengthening its accounting system in response to the Inspector General's report described in paragraph (1).

(e) TECHNICAL AMENDMENT.--Section 5422(a) of the Omnibus

Trade and Competitiveness Act of 1988 (15 U.S.C. 4603a(a)) and section 273(c)(4) of the National Defense Authorization Act for Fiscal Years 1988 and 1989 (15 U.S.C. 4603(c)(4)) are each amended by striking ``Economic Affairs'' and inserting in lieu thereof ``Technology''.

SEC. 104. NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY.

(a) FISCAL YEAR 1991.--(1) There are authorized to be appropriated to the Secretary, to carry out the intramural scientific and technical research and services activities of the National Institute of Standards and Technology (hereafter in this Act referred to as the ``Institute''), $166,228,000 for fiscal year 1991, which shall be available for the following line items:

(A) Electronics and Electrical Measurements, $21,273,000.

(B) Manufacturing Engineering, $8,266,000.

(C) Chemical Science and Technology, $18,617,000.

(D) Physics, $25,522,000.

(E) Materials Science and Engineering, $26,495,000.

(F) Building and Fire Research, $9,821,000.

(G) Computer Systems, $11,819,000.

(H) Applied Mathematics and Scientific Computing, $5,847,000.

(I) Technology Assistance, $8,978,000.

(J) Research Support Activities, $29,590,000.

(2)(A) Of the total of the amounts authorized under paragraph (1), $2,000,000 are authorized only for steel technology.

(B) Of the amount authorized under paragraph (1)(I)--

(i) $150,000 are authorized only for the evaluation of nonenergy-related inventions and related technology extension activities;

(ii) $250,000 are authorized only for Institute participation in the pilot program established under subsection (e); and

(iii) $1,700,000 are authorized only for the Institute's management of the extramural funding programs authorized under section 105.

(C) Of the total amount authorized under paragraph (1)(J), $7,223,000 are authorized only for the technical competence fund.

(b) FISCAL YEAR 1992.--(1) There are authorized to be appropriated to the Secretary, to carry out the intramural scientific and technical research and services activities of the Institute, $211,000,000 for fiscal year 1992, which shall be available for the following line items:

(A) Electronics and Electrical Measurements, $34,000,000.

(B) Manufacturing Engineering, $13,500,000.

(C) Chemical Science and Technology, $22,000,000.

(D) Physics, $27,000,000.

(E) Materials Science and Engineering, $30,000,000.

(F) Building and Fire Research, $12,300,000.

(G) Computer Systems, $16,000,000.

(H) Applied Mathematics and Scientific Computing, $6,500,000.

(I) Technology Assistance, $11,000,000.

(J) Research Support Activities, $38,700,000.

(2)(A) Of the total of the amounts authorized under paragraph (1), $2,000,000 are authorized only for steel technology.

(B) Of the amount authorized under paragraph (1)(I)--

(i) $500,000 are authorized only for the evaluation of nonenergy-related inventions and related technology extension activities;

(ii) $250,000 are authorized only for Institute participation in the pilot program established under subsection (e); and

(iii) $2,700,000 are authorized only for the Institute's management of the extramural funding programs authorized under section 105.

(C) Of the total amount authorized under paragraph (1)(J), $7,565,000 are authorized only for the technical competence fund.

(c) TRANSFERS.--(1) Funds may be transferred among the line items listed in subsection (a)(1) and among the line items listed in subsection (b)(1), so long as the net funds transferred to or from any line item do not exceed 10 percent of the amount authorized for that line item in such subsection and the Committee on Commerce, Science, and Transportation of the Senate and the Committee on Science, Space, and Technology of the House of Representatives are notified in advance of any such transfer.

(2) The Secretary may propose transfers to or from any line item listed in subsection (a)(1) or subsection (b)(1) exceeding 10 percent of the amount authorized for such line item, but such proposed transfer may not be made unless--

(A) a full and complete explanation of any such proposed transfer and the reason therefor are transmitted in writing to the Speaker of the House of Representatives, the President of the Senate, and the appropriate authorizing Committees of the House of Representatives and the Senate, and

(B) 30 calendar days have passed following the transmission of such written explanation.

(d) RELATION TO OTHER AUTHORIZATIONS.--Except for authorizations provided in the Omnibus Trade and Competitiveness Act of 1988 (Public Law 100-418; 102 Stat. 1448) and the Steel and Aluminum Energy Conservation and Technology Competitiveness Act of 1988 (15 U.S.C. 5101 et seq.), this Act contains the complete authorizations of appropriations for the Institute for fiscal year 1992.

(e) PILOT PROGRAM.--Pursuant to the authorizations contained in subsections (a)(1)(I) and (b)(1)(I), the Secretary is authorized to pay the Federal share of the cost of establishing and carrying out a pilot program under section 112 of the National Institute of Standards and Technology Authorization Act for Fiscal Year 1989 (15 U.S.C. 272 note). The purpose of the pilot program is to assist a country or countries that have requested assistance from the United States in the development of comprehensive industrial standards by providing the continuous presence of United States personnel on-site for a period of 2 or more years to provide such assistance and by providing, as necessary, additional technical support from within the Institute. Such funds may be obligated for such purpose only to the extent of matching funds from sources outside the Federal Government.

(f) CONSTRUCTION OF FACILITIES.--Section 14 of the National Institute of Standards and Technology Act (15 U.S.C. 278d) is amended by striking ``herein:'' and all that follows, and inserting in lieu thereof ``herein.''.

(g) FIRE AND BUILDING PROGRAMS.--The fire research and building technology programs of the Institute shall be combined for administrative purposes only, and separate budget accounts for fire research and building technology shall be maintained. No later than December 31, 1991, the Secretary, acting through the Director of the Institute, shall report to Congress on the results of the combination, on efforts to preserve the integrity of the fire research and building technology programs, on the long-range basic and applied research plans of the two programs, on procedures for receiving advice on fire and earthquake research priorities from constituencies concerned with public safety, and on the relation between the combined program at the Institute and the United States Fire Administration.

(h) AIRCRAFT FIRE RESEARCH.--(1) The Secretary, acting through the Director of the Institute, and the Administrator of the Federal Aviation Administration shall jointly prepare a plan for a research program to develop the fire technology and materials necessary for the development of an all fire resistant aircraft cabin interior. Such plan shall include funding requirements, a brief description of the necessary research projects, and a schedule for completion of each such research project, and shall be submitted to the Congress within 1 year after the date of enactment of this Act.

(2) Subject to the availability of appropriations, the Secretary, acting through the Director of the Institute, and the Administrator of the Federal Aviation Administration shall jointly carry out the research program described in the plan prepared under paragraph (1).

(i) EDUCATIONAL PROGRAMS.--(1) Section 18 of the National Institute of Standards and Technology Act (15 U.S.C. 278g-1)) is amended by striking the period at the end of the first sentence and inserting in lieu thereof ``, and to United States citizens for research and technical activities on Institute programs.''.

(2) Section 17 of the National Institute of Standards and Technology Act (15 U.S.C. 278g) is amended by adding at the end the following new subsection:

``(d) For any scientific and engineering disciplines for which there is a shortage of suitably qualified and available United States citizens and nationals, the Secretary is authorized to recruit and employ in scientific and engineering fields at the Institute foreign nationals who have been lawfully admitted to the United States for permanent residence under the Immigration and Nationality Act and who intend to become United States citizens. Employment of a person under this paragraph shall not be subject to the provisions of title 5, United States Code, governing employment in the competitive service, or to any prohibition in any other Act against the employment of aliens, or against the payment of compensation to them.''.

SEC. 105. EXTRAMURAL PROGRAMS OF THE INSTITUTE.

(a) FISCAL YEAR 1991.--In addition to any sums otherwise authorized under this Act, there are authorized to be appropriated to the Secretary, to carry out the extramural industrial technology services programs of the Institute created under sections 25, 26, and 28 of the National Institute of Standards and Technology Act (15 U.S.C. 278k, 278l, and 278n), $117,000,000 for fiscal year 1991, which shall be available for the following line items:

(1) Regional Centers for the Transfer of Manufacturing Technology, $15,000,000.

(2) State Technology Extension Program (carried out under section 5121(d) of the Omnibus Trade and Competitiveness Act of 1988), $2,000,000.

(3) Advanced Technology Program, $100,000,000.

(b) FISCAL YEAR 1992.--In addition to any sums otherwise authorized under this Act, there are authorized to be appropriated to the Secretary, to carry out the extramural industrial technology services programs of the Institute created under sections 25, 26, and 28 of the National Institute of Standards and Technology Act (15 U.S.C. 278k, 278l, and 278n), $127,500,000 for fiscal year 1992, which shall be available for the following line items:

(1) Regional Centers for the Transfer of Manufacturing Technology, $25,000,000.

(2) State Technology Extension Program, $2,500,000.

(3) Advanced Technology Program, $100,000,000.

(c) LIMITATION.--No funds are authorized under this section for any project under the extramural programs of the Institute which have not been competitively reviewed through the merit review processes required by the National Institute of Standards and Technology Act (15 U.S.C. 271 et seq.).

(d) AMENDMENTS TO EXTENSION PROGRAM.--Section 5121(b) of the Omnibus Trade and Competitiveness Act of 1988 (15 U.S.C. 2781 note) is amended by striking paragraph (5).

(e) ADVISORY COMMITTEE.--Section 5142(f) of the Omnibus Trade and Competitiveness Act of 1988 (15 U.S.C 4632(f)) is amended by striking ``and 1990'' and inserting in lieu thereof ``1990, 1991, and 1992''.

SEC. 106. SALARY ADJUSTMENTS.

In addition to any sums otherwise authorized by this Act, there are authorized to be appropriated to the Secretary for fiscal years 1991 and 1992 such additional sums as may be necessary to make any adjustments in salary, pay, retirement, and other employee benefits which may be provided for by law.

SEC. 107. AVAILABILITY OF APPROPRIATIONS.

Appropriations made under the authority provided in this Act shall remain available for obligation, for expenditure, or for obligation and expenditure for periods specified in the Acts making such appropriations.

SEC. 108. BUY-AMERICAN PROVISIONS.

(a) RESTRICTIONS ON CONTRACT AWARDS.--No contract or subcontract made with funds authorized under this title may be awarded for the procurement of an article, material, or supply produced or manufactured in a foreign country whose government unfairly maintains in government procurement a significant and persistent pattern or practice of discrimination against United States products or services which results in identifiable harms to United States businesses, as identified by the President pursuant to subsection (g)(1)(A) of section 305 of the Trade Agreements Act of 1979 (19 U.S.C. 2515(g)(1)(A). Any such determination shall be made in accordance with such section 305.

(b) PROHIBITION AGAINST FRAUDULENT USE OF ``MADE IN AMERICA'' LABELS.--If it has been finally determined by a court or a Federal agency that any person intentionally affixed a label bearing a ``Made in America'' inscription, or an inscription with the same meaning, to any product sold in or shipped to the United States that is not made in the United States, that person shall be ineligible to receive any contract or subcontract from the Department of Commerce, pursuant to the debarment, suspension, and ineligibility procedures in subpart 9.4 of chapter 1 of title 48, Code of Federal Regulations.

(c) BUY-AMERICAN REQUIREMENT.--(1) The Secretary is authorized to award to a domestic firm a contract for the purchase of goods that, under the use of competitive procedures, would be awarded to a foreign firm, if--

(A) the final product of the domestic firm will be completely assembled in the United States;

(B) when completely assembled, more than 50 percent of the final product of the domestic firm will be domestically produced; and

(C) the difference between the bids submitted by the foreign and domestic firms is not more than 6 percent.

(2) This subsection shall not apply to the extent to which--

(A) in the opinion of the Secretary, after taking into consideration international obligations and trade relations, such applicability would not be in the public interest;

(B) in the opinion of the Secretary, after consultation with the Secretary of Defense, compelling national security considerations require otherwise; or

(C) the President determines that such an award would be in violation of the General Agreement on Tariffs and Trade or an international agreement to which the United States is a party.

(3) This subsection shall apply only to contracts made for which--

(A) amounts are authorized by this title to be made available; and

(B) solicitations for bids are issued after the date of enactment of this Act.

(4) The Secretary, before January 1, 1993, shall report to the Congress on contracts covered under this subsection--

(A) entered into with foreign firms pursuant to a determination made under paragraph (2) of this subsection; and

(B) awarded to domestic firms pursuant to paragraph (1) of this subsection, in fiscal years 1991 and 1992.

(5) For purposes of this subsection--

(A) the term ``domestic firm'' means a business entity that is incorporated in the United States and that conducts business operations in the United States; and

(B) the term ``foreign firm'' means a business entity not described in subparagraph (A).

TITLE II--ADVANCED TECHNOLOGY PROGRAM AMENDMENTS

SEC. 201. EMERGING TECHNOLOGIES RESEARCH AND DEVELOPMENT.

(a) SHORT TITLE.--This title may be cited as the ``Emerging Technologies and Advanced Technology Program Amendments Act of 1991''.

(b) FINDINGS AND PURPOSES--(1) The Congress finds that--

(A) technological innovation and its profitable inclusion in commercial products are critical components of the ability of the United States to raise the living standards of Americans and to compete in world markets;

(B) maintaining viable United States-based high technology industries is vital to both the national security and the economic well-being of the United States;

(C) the Department of Commerce has reported that the United States is losing or losing badly, relative to Japan and Europe, in many important emerging technologies and risks losing much of the $350 billion United States market and $1 trillion world market expected to develop by the year 2000 for products based on emerging technologies;

(D) it is in the national interest for the Federal Government to encourage and, in selected cases, provide limited financial assistance to industry-led private sector efforts to increase research and development in economically critical areas of technology;

(E) joint ventures are a particularly effective and appropriate way to pool resources to conduct research that no single company is likely to undertake but which will create new generic technologies that will benefit an entire industry and the welfare of the Nation;

(F) it is vital that industry within the United States attains a leadership role and capability in development, design, and manufacturing in fields such as high-resolution information systems, advanced manufacturing, and advanced materials; and

(G) the Advanced Technology Program, established under section 28 of the National Institute of Standards and Technology Act (15 U.S.C. 278n), is the appropriate vehicle for the United States Government to provide limited assistance to joint development within the United States of new high technology capabilities in fields such as high-resolution information systems, advanced manufacturing technology, and advanced materials, and can help encourage United States industry to work together on problems of mutual concern.

(2) The purposes of this section are--

(A) to strengthen the Advanced Technology Program created under section 28 of the National Institute of Standards and Technology Act (15 U.S.C. 278n), and to provide improved guidelines for the allocation of Advanced Technology Program funds appropriated under the authorizations contained in section 105 of this Act;

(B) to promote and assist in the development of advanced technologies and the generic application of such technologies to civilian products, processes, and services;

(C) to improve the competitive position of United States industry by supporting industry-led research and development projects in areas of emerging technology which have substantial potential to advance the economic well-being and national security of the United States, such as high-resolution information systems, advanced manufacturing technology, and advanced materials; and

(D) to support projects that range from idea exploration to prototype development and address long-term, high-risk areas of technological research, development, and application that are not otherwise being adequately developed by the private sector, but are likely to yield important benefits to the Nation.

(c) ADVANCED TECHNOLOGY PROGRAM.--Section 28 of the National Institute of Standards and Technology Act (15 U.S.C. 278n) is amended--

(1) in subsection (b)(1)(B), by inserting ``through grants, cooperative agreements, or contracts'' after ``such joint ventures'';

(2) in subsection (b)(2), by inserting ``provide grants to and'' before ``enter into contracts'';

(3) by amending subsection (d)(2) to read as follows:

``(2) In the case of joint ventures, the Program shall not make an award unless the award will facilitate the formation of a joint venture or the initiation of a new research and development project by an existing joint venture.'';

(4) in subsection (d)(3), by striking ``cooperative agreement'' both places it appears and inserting in lieu

thereof ``award'';

(5) by amending subsection (d)(7) to read as follows:

``(7) Each agreement with any business or joint venture that receives an award under this section shall specify a test, as mutually agreed to by the Secretary and the recipient, for determining whether the venture or project shall be deemed to have been a commercial success and providing that in such event there will be appropriate recoupment to the Federal Government. Such recoupment shall not exceed the principal amount, with reasonable interest, of any monetary awards provided to such recipient under the Program. The Secretary shall issue regulations establishing guidelines for agreement provisions stating the circumstances under which a venture or project will be found to be a commercial success and the general procedures and terms for recoupment in such cases.'';

(6) by adding at the end of subsection (d) the following new paragraphs:

``(10) A company shall be eligible to receive financial assistance under this section only if--

``(A) the Secretary finds that the company's participation in the Program would be in the economic interest of the United States, as evidenced by investments in the United States in research, development, and manufacturing (including, for example, the manufacture of major components or subassemblies in the United States); significant contributions to employment in the United States; and agreement with respect to any technology arising from assistance provided under this section to promote the manufacture within the United States of products resulting from that technology (taking into account the goals of promoting the competitiveness of United States industry), and to procure parts and materials from competitive suppliers; and

``(B) either--

``(i) the company is a United States-owned company; or

``(ii) the Secretary finds that the company has a parent company which is incorporated in a country which affords to United States-owned companies opportunities, comparable to those afforded to any other company, to participate in any joint venture similar to those authorized under this Act; affords to United States-owned companies local investment opportunities comparable to those afforded to any other company; and affords adequate and effective protection for the intellectual property rights of United States-owned companies.

"(11) Grants, contracts, and cooperative agreements under this section shall be designed to support projects which are high risk and which have the potential for eventual substantial widespread commercial application. In order to receive a grant, contract, or cooperative agreement under this section, a research and development entity shall demonstrate to the Secretary the requisite ability in research and technology development and management in the project area in which the grant, contract, or cooperative agreement is being sought.

"(12)(A) Title to any intellectual property arising from assistance provided under this section shall vest in a company or companies incorporated in the United States. The United States may reserve a nonexclusive, nontransferable, irrevocable paid-up license, to have practiced for or on behalf of the United States, in connection with any such intellectual property, but shall not, in the exercise of such license, publicly disclose proprietary information related to the license. Title to any such intellectual property shall not be transferred or passed, except to a company incorporated in the United States, until the expiration of the first patent obtained in connection with such intellectual property.

"(B) For purposes of this paragraph, the term 'intellectual property' means an invention patentable under title 35, United States Code, or any patent on such an invention.

``(C) Nothing in this paragraph shall be construed to prohibit the licensing to any company of intellectual property rights arising from assistance provided under this section.'';

(7) by amending subsection (e) to read the follows:

``(e) The Secretary may, 30 days after notice to Congress, suspend a company or joint venture from receiving continued assistance under this section if the Secretary determines that the company, the country of incorporation of the company or a parent company, or the joint venture has failed to satisfy any of the criteria set forth in subsection (d)(10), and that it is in the national interest of the United States to do so.''; and

(8) by inserting after subsection (e) the following new subsections:

``(f) When reviewing private sector requests for Department of Commerce assistance to proposed joint ventures, and when monitoring the progress of assisted joint ventures, the Secretary shall, as appropriate, coordinate with the Secretary of Defense and other senior Federal officials to ensure cooperation and coordination in Federal technology programs and to avoid unnecessary duplication of effort. The

Secretary is authorized to work with the Secretary of Defense and other appropriate Federal officials to form interagency working groups or special project offices to coordinate Federal technology activities.

``(g) In order to analyze the need for and value of joint ventures in specific technical fields, to evaluate any joint ventures requesting the Secretary's assistance, or to monitor the progress of any joint venture which receives Federal funds pursuant to the authorizations contained in this section, the Secretary, the Under Secretary, and the Director may organize and seek advice from such industry advisory committees as they consider useful and appropriate.

``(h) Up to 10 percent of the funds appropriated for carrying out this section may be used for standards development and technical activities by the Institute in support of the purposes of this section.

``(i) As used in this section--

``(1) the term `high-resolution information systems' means equipment and techniques required to create, transmit, receive, display, process, record, store, recover, and play back high resolution images and accompanying sound;

``(2) the term `advanced manufacturing technology' means numerically-controlled machine tools, robots, automated process control equipment, computerized flexible manufacturing systems, associated computer software, and other technology for improving manufacturing and industrial processes;

``(3) the term `advanced materials' means a field of research including the study of composites, ceramics, metals, polymers, superconducting materials, materials produced through biotechnology, and materials production technologies, including coated systems, that provide the potential for significant advantages over existing materials;

``(4) the term `joint venture' means any group of activities, including attempting to make, making, or performing a contract, by two or more persons for the purpose of--

``(A) theoretical analysis, experimentation, or systematic study of phenomena or observable facts;

``(B) the development or testing of basic engineering techniques;

``(C) the extension of investigative finding or theory of a scientific or technical nature into practical application for experimental and demonstration purposes, including the experimental production and testing of models, prototypes, equipment, materials, and processes;

``(D) the collection, exchange, and analysis of research information;

``(E) the production of any product, process, or service; or

``(F) any combination of the purposes specified in subparagraphs (A), (B), (C), (D), and (E),

and may include the establishment and operation of facilities for the conducting of research, the conducting of such venture on a protected and proprietary basis, and the prosecuting of applications for patents and the granting of licenses for the results of such venture;

``(5) the term `United States-owned company' means a company that has majority ownership or control by individuals who are citizens of the United States; and

``(6) the term `foreign-owned company' means a company other than a United States-owned company.''.

(d) EFFECTIVE DATE.--The amendments in subsection (c) shall take effect immediately upon enactment; however, the amendments shall not apply to applications submitted in response to the Federal Register Invitation for Proposals dated July 24, 1990, or awards or other assistance granted pursuant to that notice.

(e) MANAGEMENT COSTS.--Section 2 of the National Institute of Standards and Technology Act (15 U.S.C. 272) is amended by adding at the end thereof the following new subsection--

``(d) In carrying out the extramural funding programs of the Institute, including the programs established under sections 25, 26, and 28 of this Act, the Secretary may retain reasonable amounts of any funds appropriated pursuant to authorizations for these programs in order to pay for the Institute's management of these programs.''.

(f) COMPREHENSIVE REPORT.--The Secretary of Commerce shall, not later than 4 years after the date of enactment of this Act, submit to each House of the Congress and the President a comprehensive report on the results of the Advanced Technology Program established under section 28 of the National Institute of Standards and Technology Act (15 U.S.C. 278n), including any activities in the areas of high-resolution information systems, advanced manufacturing technology, and advanced materials.

TITLE III--AMENDMENTS TO THE STEVENSON-WYDLER TECHNOLOGY INNOVATION ACT OF 1980

SEC. 301. FEDERAL LABORATORY CONSORTIUM.

(a) Section 11(e)(7) of the Stevenson-Wydler Technology Innovation Act of 1980 (15 U.S.C. 3710(e)(7)) is amended--

(1) in subparagraph (A), by striking ``a fiscal year referred to in subparagraph (B)(ii)'' and inserting in lieu thereof ``any fiscal year''; and

(2) by amending subparagraph (B) to read as follows:

``(B) A transfer shall be made by any Federal agency under subparagraph (A), for any fiscal year, only if the amount so transferred by that agency (as determined under such subparagraph) would exceed $10,000.''.

(b) Section 11(e)(8) of the Stevenson-Wydler Technology Innovation Act of 1980 (15 U.S.C. 3710(e)(8)) is repealed.

SEC. 302. COOPERATIVE RESEARCH AND DEVELOPMENT AGREEMENTS.

(a) Section 12(d)(1) of the Stevenson-Wydler Technology Innovation Act of 1980 (15 U.S.C. 3710a(d)(1)) is amended by inserting ``intellectual property,'' after ``equipment,'' both places it appears.

(b) Within 6 months after the date of enactment of this Act, the Secretary shall report to the Congress on the advisability of authorizing a new form of cooperative research and development agreement which would permit Federal contributions of funds.

SEC. 303. DEFINITION OF FEDERAL AGENCY.

Section 4(8) of the Stevenson-Wydler Technology Innovation Act of 1980 (15 U.S.C. 3703(8)) is amended by inserting ``, as well as any agency of the legislative branch of the Federal Government'' after ``of such title''.

SEC. 304. QUALITY IMPROVEMENT.

The Secretary is authorized to use appropriated funds to cover the cost of the Malcolm Baldrige National Quality Award program to the extent such funds are needed in addition to the funds specified under section 17(f) of the Stevenson-

Wydler Technology Innovation Act of 1980 (15 U.S.C. 3711a(f)).

SEC. 305. UNDER SECRETARY.

Section 5(c) of the Stevenson-Wydler Technology Innovation Act of 1980 (15 U.S.C. 3704(c) is amended--

(1) by redesignating paragraphs (13) and (14) as paragraphs (14) and (15), respectively; and

(2) by inserting after paragraph (12) the following new paragraph:

``(13) serve as a focal point for discussions among United States companies on topics of interest to industry and labor, including discussions regarding manufacturing and discussions regarding emerging technologies;''.

TITLE IV--NATIONAL COMMISSION ON REDUCING CAPITAL COSTS FOR EMERGING TECHNOLOGY

SEC. 401. NATIONAL COMMISSION ON REDUCING CAPITAL COSTS FOR EMERGING TECHNOLOGY.

(a) ESTABLISHMENT AND PURPOSE.--There is established a National Commission on Reducing Capital Costs for Emerging Technology (hereafter in this section referred to as the ``Commission''), for the purpose of developing recommendations to increase the competitiveness of United States industry by encouraging investments in research, the development of new process and product technologies, and the production of those technologies.

(b) ISSUES.--The function of the Commission shall be to address the following issues:

(1) How has the overall cost of capital paid by United States companies differed during the past decade from that paid by companies in other industrial economies such as Germany, Japan, and the United Kingdom?

(2) To what extent has the cost of capital faced by technology companies differed from the overall cost of capital in each of these nations during the same period?

(3) To what extent do high capital costs in general inhibit investment in projects with long-term payoffs, such as the development and commercialization of new technology?

(4) To what extent does the structure of the financial services industry in the United States affect the flow of capital to advanced technology investment, and to what extent do current practices in the equity markets raise the cost of capital and inhibit the availability of capital to fund research and development, purchase advanced manufacturing equipment, and fund other investments necessary to commercialize advanced technology?

(5) In what ways to Government regulations influence the cost of capital in the United States?

(6) To what extent have national differences in

capital costs facilitated the foreign acquisition of technology-based United States companies?

(7) What macroeconomic and other policies would promote greater investment in advanced manufacturing techniques, in research and development, and in other activities necessary to commercialize and produce new technologies?

(8) What specific policies should the Federal Government follow in order to reduce the cost of capital for United States companies to levels that are near parity with those faced by the Nation's principal trading partners?

(c) MEMBERSHIP.--(1) The Commission shall be composed of 9 members who are eminent in such fields as advanced technology, manufacturing, finance, and international economics and who are appointed as follows:

(A) 3 individuals appointed by the President, one of whom shall be the Vice President and shall chair the Commission.

(B) 3 individuals appointed by the Speaker of the House of Representatives, 1 of whom shall be appointed upon the recommendation of the minority leader of the House of Representatives.

(C) 3 individuals appointed by the President pro tempore of the Senate, 2 of whom shall be appointed upon the recommendation of the majority leader of the Senate and 1 of whom shall be appointed upon the recommendation of the minority leader of the Senate.

(2) Each member shall be appointed for the life of the Commission. A vacancy in the Commission shall be filled in the manner in which the original appointment was made.

(d) PROCEDURES.--(1) The chairman shall call the first meeting of the Commission within 90 days after the date of enactment of this Act.

(2) Recommendations of the Commissions shall require the approval of three-quarters of the members of the Commission.

(3) The Commission may use such personnel detailed from Federal agencies as may be necessary to enable it to carry out its duties.

(4) Members of the Commission, other than full-time employees of the Federal Government, while attending meetings of the Commission while away from their homes or regular places of business, shall be allowed travel expenses in accordance with subchapter I of chapter 57 of title 5, United States Code.

(e) REPORTS.--The Commission shall, within 1 year after the date of enactment of this Act, submit to the President and Congress a report containing legislative and other recommendations with respect to the issues addressed under subsection (b).

(f) CONSULTATION.--The Commission shall consult, as appropriate, with the Commission on Technology and Procurement established by section 504 of this Act.

(g) TERMINATION.--The Commission shall terminate 6 months after the submission of its report under subsection (e).

(h) AUTHORIZATION OF APPROPRIATIONS.--There are authorized to be appropriated to carry out this section such sums as may be necessary for the fiscal years 1991 and 1992.

TITLE V--STUDIES AND REPORTS

SEC. 501. HIGH-RESOLUTION INFORMATION SYSTEMS ADVISORY BOARD.

(a) ESTABLISHMENT AND PURPOSE.--The Director of the Office of Science and Technology Policy shall establish within that office a High-Resolution Information Systems Advisory Board (hereafter in this section referred to the ``Board´´) to monitor and, as appropriate, foster the development of United States-based high-resolution information systems industries.

(b) DEFINITION.--As used in this title, the term ``high-resolution information systems´´ means the equipment and techniques required to create, store, recover, and play back high-resolution images and accompanying sound.

(c) FUNCTIONS.--The Board shall--

(1) collect and analyze information on the range of factors which will determine whether United States-based high-resolution information systems industries will

develop and become competitive, including such factors as technology policies, specialized financial problems, international standards and foreign trade practices, Federal regulations and procurement policies, and licensing practices;

(2) identify areas where appropriate cooperation between the Federal Government and the private sector, including Government support for industry-led joint research and development ventures, would enhance United States industrial competitiveness in this area, and provide advice and guidance for such cooperative efforts;

(3) provide guidance on what Federal policies and practices, particularly in such areas as procurement and the transfer of federally-funded research, are necessary to help establish United States-based high-resolution information systems industries;

(4) provide advice on the coordination of Federal defense and civilian activities to maximize and assist with the transfer of technologies in the field of high-resolution information systems into commercial products; and

(5) generally develop recommendations for guiding Federal agency activities related to the development of United States-based high-resolution information systems industries.

(d) MEMBERSHIP AND PROCEDURES.--(1)(A) The Board shall be composed of 13 members, 7 of whom shall constitute a quorum.

(B) The Director of the Office of Science and Technology Policy, the Secretary, the Director of the Defense Advanced Research Projects Agency, and the Administrator of the National Aeronautics and Space Administration, or their designees, shall serve as members of the Board.

(C) The President, acting through the Director of the Office of Science and Technology Policy, within 90 days after the date of enactment of this Act, shall appoint as additional members of the Board--

(i) 5 members from the private electronics manufacturing sector, drawn from such sectors as semiconductors, display equipment, computers, consumer electronics, and telecommunications, with 1 member also representing labor;

(ii) 3 members from the private nonmanufacturing sector, including 1 representative from the transmission delivery systems sector and 2 representatives drawn from such areas as the software industry, the entertainment industry, and the investment community; and

(iii) 1 member from academia.

At least 1 member appointed under this subparagraph shall be from small business.

(2) The Director of the Office of Science and Technology

Policy or the Director's designee shall chair the Board.

(3) The chairman shall call the first meeting of the Board within 30 days after the appointment of members is completed.

(4) The Board may use such personnel detailed from Federal agencies as may be necessary to enable it to perform its functions.

(5) Members of the Board, other than full-time employees of the Federal Government, while attending meetings of the Board or otherwise performing duties of the Board while away from their homes or regular places of business, shall be allowed travel expenses in accordance with subchapter I of chapter 57 of title 5, United States Code.

(6) The Board shall submit to the President and Congress a report of its activities once every year after its establishment.

(e) AUTHORIZATION OF APPROPRIATIONS.--There are authorized to be appropriated to carry out this section such sums as may be necessary for the fiscal years 1991 and 1992.

SEC. 502. MAJOR SCIENCE AND TECHNOLOGY PROPOSALS.

(a) REPORT.--The National Science and Technology Policy, Organization, and Priorities Act of 1976 is amended by adding at the end of title II the following new section:

``MAJOR SCIENCE AND TECHNOLOGY PROPOSALS

``SEC. 209. The Director shall monitor and report annually to Congress on each major science and technology project in which more than one country is participating and which has a total estimated cost greater than $1,000,000,000.''.

SEC. 503. BIENNIAL NATIONAL CRITICAL TECHNOLOGIES REPORT AMENDMENTS.

Section 603 of the National Science and Technology Policy, Organization, and Priorities Act of 1976 (42 U.S.C. 6683) is amended--

(1) in subsection (a), by inserting ``, but shall include the most economically important emerging civilian technologies during the 10-year period following such report, together with the estimated current and future size of domestic and international markets for products derived from these technologies'' after ``may not exceed 30'';

(2) in subsection (b), by striking ``national security and'' and inserting in lieu thereof ``national security or'';

(3) by redesignating subsection (d) as subsection (e); and

(4) by inserting after subsection (c) the following new subsection:

``(d) Each such report shall include--

``(1) an identification of the types of research and development needed to close any significant gaps or deficiencies in the technology base of the United States, as compared with the technology bases of major trading partners; and

``(2) a list of the technologies and markets targeted by major trading partners for development or capture.''.

SEC. 504. RESEARCH, DEVELOPMENT, TECHNOLOGY UTILIZATION, AND GOVERNMENT PROCUREMENT POLICY.

(a) ESTABLISHMENT OF COMMISSION.--The Secretary, in consultation with the Administrator of the Office of Federal Procurement Policy, shall establish a Commission on Technology and Procurement (hereafter in this section referred to as the ``Commission''), for the purposes of analyzing the effect of Federal Government procurement laws, procedures, and policies on the development of advanced technologies within the United States and making recommendations on how Federal policy could be changed to promote further the development of advanced technologies.

(b) ISSUES.--The Commission shall address the following issues:

(1) To what extent, if any, should Federal Government technology purchase strategies be used to give domestic suppliers a competitive advantage in new generations of existing technologies and in initial market penetration for new technologies?

(2) Under what conditions can Federal Government purchases of advanced technology-based products be based on performance specifications rather than on product specifications? Should Federal Government procurement first look to the commercial markets for products that will meet performance specifications before purchasing a unique product that has to be developed?

(3) How can the Federal Government procurement laws, practices, and procedures be used as a strategic tool to foster the use of emerging technologies?

(4) How can the Federal Government ensure that its suppliers adopt the principles embodied in the Malcolm Baldrige National Quality Award?

(5) Should Federal Government procurement practices include cooperative efforts between the supplier and the Federal entity to develop products so as to be more easily marketed on a commercial basis? Should a program for the exchange of technical personnel to foster innovation in product development be part of such practices?

(6) To what extent, if any, should Federal Government documents specify standards that are beneficial to domestic suppliers, aid the compatibility of advanced technologies, and speed the commercial acceptance of those technologies, and what would be the role of the

Institute in such an effort?

(7) To what extent should worldwide, state of the art technology be required in Federal Government procurement?

(c) MEMBERSHIP AND PROCEDURES.--(1) The Commission shall be composed of 15 members, 8 of whom shall constitute a quorum.

(2) The Secretary, the Administrator of the Office of Federal Procurement Policy, the Director of the Office of Science and Technology Policy, the Secretary of Defense, and the Administrator of General Services, or their designees who serve in executive level positions, shall serve as members of the Commission.

(3) The Secretary shall appoint as members of the Commission, from among individuals not employed by the Federal Government--

(A) 4 members who are eminent in advanced technology businesses representing manufacturing and services industries, including at least 1 member representing labor;

(B) 3 members who are eminent in the fields of technology and international economic development; and

(C) with the concurrence of the Administrator of the Office of Federal Procurement Policy, 3 members who are eminent in the field of Federal Government procurement.

(4) The Secretary shall appoint a Commission chairman

from among the members of the Commission. The chairman shall call the first meeting of the Commission within 90 days after the date of enactment of this Act.

(5) The Secretary and the Administrator of the Office of Federal Procurement Policy shall provide such staff as may be required by the Commission to carry out its responsibilities.

(6) Members of the Commission, other than full-time employees of the Federal Government, while attending meetings of the Commission or otherwise performing duties of the Commission while away from their homes or regular places of business, shall be allowed travel expenses in accordance with subchapter I of chapter 57 of the title 5, United States Code.

(d) REPORTS.(1) The Commission shall, within 1 year after the date of enactment of this Act, submit to the Secretary, the Administrator of the Office of Federal Procurement Policy, the President, and Congress a report containing preliminary recommendations with respect to the issues addressed under subsection (b).

(2) The Commission shall, within 2 years after the date of enactment of this Act, submit to the Secretary and Congress a final report containing final recommendations with respect to the issues addressed under subsection (b).

(e) CONSULTATION.--The Commission shall consult, as appropriate, with the National Commission on Reducing Capital

Costs for Emerging Technology.

(f) TERMINATION.--The Commission shall terminate 6 months after the submission of its final report under subsection (d)(2).

(g) AUTHORIZATION OF APPROPRIATIONS.--There are authorized to be appropriated to carry out this section such sums as may be necessary for the fiscal years 1991, and 1992, and 1993.

SEC. 505. REPORT ON INFORMATION COLLECTION AND DISSEMINATION.

(a) REPORT.--Within 270 days after the date of enactment of this Act, the Secretary shall report to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate on the feasibility of establishing and operating a Federal Online Information Product Catalog (FEDLINE) at the National Technical Information Service which would serve as a comprehensive inventory and authorizative register of information products and services disseminated by the Federal Government and assist agencies and the public in locating Federal Government information. Information protected from public disclosure shall not be included. In studying the concept, the Secretary, acting through the Under Secretary and the Director of the National Technical Information Service, shall consult with officials from appropriate Government agencies, including the Office of Management and Budget, the National Archives, the Government Printing Office, and the Institute, and with representatives of the public, for their views on the optimal composition and format of FEDLINE. Such report shall contain cost estimates and possible funding sources for establishing and operating FEDLINE and shall list any changes in law and regulation that would be required if FEDLINE were to be implemented.

(b) FUNDING.--The Director of the National Technical Information Service may retain and use all monies received, including receipts, revenues, and advanced payments and deposits, to fund obligations and expenses through the end of fiscal year 1992.

(c) ELECTRONIC FORMAT.--Section 212(e)(5) of the National Technical Information Act of 1988 (15 U.S.C. 3704b(e)(5)) is amended by inserting ``, including producing and disseminating information products in electronic format'' after ``engineering information''.

SEC. 506. REPORT ON ADVANCED MANUFACTURING AND QUALITY.

Within 1 year after the date of enactment of this Act, the Secretary shall submit to Congress a report on the feasibility and advisability of establishing, in affiliation with the Institute, a Quality Institute and a privately-funded foundation to support that Quality Institute. As part of such report, the Secretary shall consider whether it is feasible and advisable for such Quality Institute to--

(1) conduct workshops and company tours to share with managers, engineers, and production employees in the United States advanced techniques for improving manufacturing and service organization, quality, and productivity, including team-oriented organizational approaches to managing production and service technology and corporate research and development;

(2) help develop and disseminate model curricula on quality which might be used by educational institutions to provide training to students and manufacturing and service company employees; and

(3) carry out such other purposes as the Secretary may recommend.

SEC. 507. FUNCTIONS OF COUNCIL.

(a) INTERAGENCY RESEARCH PLANS.--Section 102(a)(6) of the National Science and Technology Policy, Organization, and Priorities Act of 1976 (42 U.S.C. 6602(a)(6)) is amended to read as follows:

``(6) The development and implementation of long-range, interagency research plans to support policy decisions regarding identified national and international concerns, and for which a sustained and coordinated commitment to improving scientific understanding or technology will be required.''.

(b) COUNCIL.--Section 401 of the National Science and Technology Policy, Organization, and Priorities Act of 1976 (42 U.S.C. 6651) is amended to read as follows:

``MEMBERSHIP AND FUNCTIONS OF COUNCIL

``SEC. 401. (a) The Federal Coordinating Council for Science, Engineering, and Technology (hereafter in this Act referred to as the `Council') shall be composed of the Director, who shall be Chairman of the Council, and 1 representative of each of the Federal departments and agencies which the President shall designate. Each such representative shall be an official of policy rank appointed by the head of the Federal department or agency designated.

``(b) The Council shall consider problems and developments in the fields of science, engineering, and technology and related activities affecting more than 1 Federal agency, and shall recommend policies and other measures designed to--

``(1) provide more effective planning and administration of Federal scientific, engineering, and technological programs;

``(2) identify research needs, including areas requiring additional emphasis;

``(3) achieve more effective utilization of the scientific, engineering, and technological resources and facilities of Federal agencies, including the elimination of unwarranted duplication; and

``(4) further international cooperation in science, engineering, and technology.

``(c) The Council may be assigned responsibility for developing long-range and coordinated plans for scientific and technical research which involve the participation of more than 2 Federal agencies. Such plans shall--

``(1) identify research approaches and priorities which most effectively advance scientific understanding and provide a basis for policy decisions;

``(2) provide for effective cooperation and coordination of research among Federal agencies; and

``(3) encourage domestic and, as appropriate, international cooperation among government, industry, and university scientists.

``(d) The Council shall perform such other related advisory duties as shall be assigned by the President or by the Chairman of the Council.

``(e) For the purpose of carrying out the provisions of this section, each Federal agency represented on the Council shall furnish necessary assistance to the Council. Such assistance may include--

``(1) detailing employees to the Council to perform such functions, consistent with the purposes of this section, as the Chairman of the Council may assign to them; and

``(2) undertaking, upon request of the Chairman, such special studies for the Council as come within the scope of authority of the Council.

``(f) For the purpose of developing interagency plans, conducting studies, and making reports as directed by the Chairman, standing committees and working groups of the Council may be established.''.

(c) CONFORMING AMENDMENT.--Section 207(a)(1)) of the National Science and Technology Policy, Organization, and Priorities Act of 1976 (42 U.S.C. 6616(a)(1)) is amended by striking ``established under title IV''.

SEC. 508. STUDY OF TESTING AND CERTIFICATION.

(a) CONTRACT WITH NATIONAL RESEARCH COUNCIL.--Within 90 days after the date of enactment of this Act and within available appropriations, the Secretary shall enter into a contract with the National Research Council for a thorough review of international product testing and certification issues. The National Research Council will be asked to address the following issues and make recommendations as appropriate:

(1) The impact on United States manufacturers, testing and certification laboratories, certification organizations, and other affected bodies of the European Community's plans for testing and certification of

regulated and nonregulated products of non-European origin.

(2) Ways for United States manufacturers to gain acceptance of their products in the European Community and in other foreign countries and regions.

(3) The feasibility and consequences of having mutual recognition agreements between testing and certification organizations in the United States and those of major trading partners on the accreditation of testing and certification laboratories and on quality control requirements.

(4) Information coordination regarding product acceptance and conformity assessment mechanisms between the United States and foreign governments.

(5) The appropriate Federal, State, and private roles in coordination and oversight of testing, certification, accreditation, and quality control to support national and international trade.

(b) MEMBERSHIP.--In selecting the members of the review panel, the National Research Council shall consult with and draw from, among others, laboratory accreditation organizations, Federal and State government agencies involved in testing and certification, professional societies, trade associations, small business, and labor organizations.

(c) REPORT.--A report based on the findings and recommendations of the review panel shall be submitted to the Secretary, the President, and Congress within 18 months after the Secretary signs the contract with the National Research Council.

SEC. 509. REPORT ON A STRATEGY TO STIMULATE COMPETITIVE RESEARCH.

(a) IN GENERAL.--No later than 120 days after the date of enactment of this Act, the Director of the Office of Science and Technology Policy shall submit to Congress a report presenting a proposed strategy for improving the university research capabilities of those States which historically have received relatively little Federal research and development funding. The report shall particularly discuss the feasibility and advisability of using the National Science Foundation's Experimental Program to Stimulate Competitive Research as a model for similar programs in other Federal departments and agencies which fund research and development.

(b) ANALYSIS AND DISCUSSION.--The report shall include an analysis and discussion of--

(1) the geographic distribution of Federal research and development grants and contracts;

(2) current Federal efforts to stimulate competitive research; and

(3) the feasibility and advisability of new Federal programs to stimulate competitive research.

SEC. 510. INTERAGENCY COORDINATION.

The Secretary shall, within 180 days after the date of enactment of this Act, submit to the Committee on Science, Space, and Technology and the Committee on Energy and Commerce of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate, a plan for coordination of Commerce Department efforts with other Federal agencies for activities related to high-resolution information systems, including research and development activities.

TITLE VI--LEAD EXPOSURE HAZARDS

SEC. 601. FINDINGS.

The Congress finds that--

(1) lead is a naturally occurring element which has been used in a variety of industrial applications including radiation shields, storage batteries, paint, and gasoline;

(2) 1 in 6 United States children are victims of lead poisoning, according to the Agency for Toxic Substances and Disease Registry;

(3) lead poses a significant environmental health problem since adverse effects have been conclusively demonstrated at relatively low exposures;

(4) lead exposures to children under age 7 are of greatest concern because of its association with

significant neurotoxic effects, including reduction in intelligence, attention span deficits, and reading and learning disabilities;

(5) a primary cause of childhood lead poisoning is lead-based paint and dust in homes;

(6) past efforts to abate lead-based paint have relied on methods which endangered workers and often resulted in more available lead dust for the occupants; and

(7) improving methods for testing and abating lead-based paint offers a highly cost effective means of reducing exposures and thus preventing childhood lead poisoning.

SEC. 602. LABORATORY ANALYSIS STANDARDIZATION.

The National Institute of Standards and Technology shall, within 18 months after the date of enactment of this Act, recommend to the Administrator of the Environmental Protection Agency technical criteria and implement a voluntary accreditation program with respect to laboratory analysis of lead in paint films, soil, and dust. Funds required for implementing such a voluntary accreditation program shall be provided to the National Institute of Standards and Technology by the Administrator of the Environmental Protection Agency. Funds received through fees and other charges for accreditation services under such program may be used by the National Institute of Standards and Technology for operating costs of the program.

SEC. 603. DETECTION TECHNOLOGY STANDARDIZATION.

Subject to the availability of funds, the National Institute of Standards and Technology shall, within 2 years after the date of enactment of this Act, recommend to the Administrator of the Environmental Protection Agency protocols, criteria, reference materials, and minimum performance standards to be used in the evaluation of emerging products and techniques for detecting lead in paint films and dust, including x-ray fluorescence devices, on-site chemical spot testers, and laboratory methods, and to ensure reliable, accurate, and effective lead detection technologies.

SEC. 604. STANDARDIZATION OF ABATEMENT PRODUCTS.

Subject to the availability of funds, the National Institute of Standards and Technology shall recommend to the Administrator of the Environmental Protection Agency performance criteria and standards for lead paint encapsulants and for strippers within 2 years after the date of enactment of this Act.

Mr. VALENTINE. Now, before proceeding further, I will again recognize the distinguished ranking member of the subcommittee, Mr. Lewis of Florida.

Mr. LEWIS. Mr. Chairman, I have no further comments to make on this bill.

Mr. VALENTINE. The Chair will recognize at this time such other members of the subcommittee as desire to be heard.

[No response.]

Mr. VALENTINE. The Chair asks unanimous consent that the subcommittee print before you be considered as original text for purposes of this markup.

Mr. LEWIS. So moved.

Mr. VALENTINE. Without objection, it is so ordered.

The bill is open for discussion at this point.

Mr. MINETA. Mr. Chairman, I have an amendment to offer at this point, then.

Mr. VALENTINE. The gentleman from California, Mr. Mineta, is recognized.

Mr. MINETA. If the Clerk would go ahead and distribute -- has it already been distributed to the members? All right.

Mr. VALENTINE. I believe this amendment appears as Amendment No. 2 in your collection, there?

Mr. MINETA. It does.

Mr. VALENTINE. The gentleman from Florida--from California

Mr. MINETA. We are as sunshiny as Florida, and I do appreciate the reference.

Mr. VALENTINE. More sunshine, and more senior.

Mr. MINETA. Hardly.

First of all, I want to commend you for your leadership and that of Mr. Lewis for bringing forward the ATP program again for 1991.

This amendment that I am offering will require the Secretary of Commerce to identify those industries in the United States that are vital to the continued development of commercial industry in the United States. For years, Mr. Chairman, the Federal Government has been successful in supporting the Nation's defense-related industries and in promoting sales of military exports. I believe it is now time to follow a similar strategy as it relates to commercial industry.

The amendment I am offering will require the Secretary to develop a plan outlining the public and private efforts that are needed to ensure the growth and stability of economically critical industries. Industries such as semiconductors, computers, high-definition systems, and machine tools are some of the critical industries that will provide the bulk of employment opportunity and economic growth as the world turns from military confrontation to economic competition.

So, Mr. Chairman, the first step toward a successful economic future is to identify those critical industries and evaluate their health so that Government and industry will be able to work together to guarantee their future.

So I urge support of this amendment.

[Amendment No. 2, offered by Mr. Mineta, follows:]

*********** INSERT **<>******

MINETA009

AMENDMENT TO THE SUBCOMMITTEE PRINT
OFFERED BY MR. MINETA

Page 38, after line 11, insert the following new section:

SEC. 504. CRITICAL INDUSTRIES.

(a) IDENTIFICATION OF INDUSTRIES AND DEVELOPMENT OF PLAN.--The Secretary shall--

(1) identify those civilian industries in the United States that are necessary to support a robust manufacturing infrastructure and critical to the economic security of the United States;

(2) list the major research and development initiatives being undertaken, and the substantial investments being made, by the Federal Government, including its research laboratories, in each of the critical industries identified under paragraph (1); and

(3) develop a 10-year plan outlining the major public and private efforts, including research and development, needed to ensure the growth and stability of each critical industry identified under paragraph (1).

(b) INITIAL REPORT.--The Secretary shall submit a report to the Congress within 1 year after the date of enactment of this Act on the actions taken under subsection (a).

(c) ANNUAL UPDATES.--The Secretary shall annually submit to the Congress an update of the report submitted under subsection (b). Each such update shall--

(1) describe the status of each identified critical industry, including the advances and declines occurring since the most recent report;

(2) identify any industries that should be added to the list of critical industries; and

(3) recommend measures, including research and development, necessary to ensure the continued successful development of each identified critical industry.

Redesignate subsequent sections accordingly.

Mr. VALENTINE. Is there any discussion?

Mr. LEWIS. Mr. Chairman, I would just like to point out that Florida is only too happy to share its sunshine with California and other States as it shines upon this committee, and we have no objection to the amendment.

[Laughter.]

Mr. MINETA. Could I include water in that?

Mr. LEWIS. We don't have enough of that, I'm sorry.

[Laughter.]

Mr. VALENTINE. If there is no further discussion, those in favor of the amendment will say aye.

[Chorus of ayes.]

Mr. VALENTINE. Those opposed, nay.

[No response.]

Mr. VALENTINE. The ayes have it. The amendment is adopted.

In your package there is an amendment designated as Amendment No. 1, which is on my script as the Ritter amendment.

Mr. LEWIS. Mr. Chairman, I am offering this amendment for Mr. Ritter, the gentleman from Pennsylvania, who could not be here today because he is attending the funeral of Senator Heinz. So therefore I am offering this amendment on his behalf.

The intent of the amendment, as I understand it, is to establish a National Council on Quality. There is no funding requested in this amendment. The amendment has as its intent the establishment, through the Quality Council, of national goals and priorities for quality management; to increase quality management in the United States; and to increase U.S. competitiveness.

I am not aware of any opposition to the Ritter amendment. Therefore, Mr. Chairman, I would move its adoption.

[The amendment offered by Mr. Ritter follows:]

********** INSERT **********

RITTER195

AMENDMENT TO THE SUBCOMMITTEE PRINT
OFFERED BY MR. RITTER

Page 43, line 19, through page 44, line 14, amend section 506 to read as follows:

SEC. 506. NATIONAL QUALITY COUNCIL.

(a) ESTABLISHMENT AND FUNCTIONS.--There is established a National Quality Council (hereafter in this Act referred to as the ``Council''). The functions of the Council shall be--

(1) to establish national goals and priorities for Quality performance in business, education, government, and all other sectors of the nation;

(2) to encourage and support the voluntary adoption of these goals and priorities by companies, unions, professional and business associations, coalition groups, and units of government, as well as private and nonprofit organizations;

(3) to arouse and maintain the interest of the people of the United States in Quality performance, and to encourage the adoption and institution of Quality performance methods by all corporations, government agencies, and other organizations; and

(4) to conduct an annual White House Conference on Quality Performance in the American Workplace that would

bring together in a single forum national leaders in business, labor, education, professional societies, the media, government, and politics to address Quality performance as a means of improving United States competitiveness.

(b) MEMBERSHIP.--The Council shall consist of not less than 17 nor more than 20 members, appointed by the President of the United States by and with the advice and consent of the Senate. Members shall include--

(1) at least 2 but not more than 3 representatives from manufacturing industry;

(2) at least 2 but not more than 3 representatives from service industry;

(3) at least 2 but not more than 3 representatives from national Quality not-for-profit organizations;

(4) two representatives from education, one with expertise in elementary and secondary education, and one with expertise in post-secondary education;

(5) one representative from labor;

(6) one representative from professional societies;

(7) one representative each from local and State government;

(8) one representative from the Federal Quality Institute;

(9) one representative from the National Institute of

Standards and Technology;

(10) one representative from the Department of Defense;

(11) one representative from a civilian Federal agency not otherwise represented on the Council, to be rotated among such agencies every 2 years; and

(12) one representative from the Foundation for the Malcolm Baldrige National Quality Award.

(c) TERMS.--The term of office of each member of the Council appointed under paragraphs (1) through (7) of subsection (b) shall be 2 years, except that when making the initial appointments under such paragraphs, the President shall appoint not more than 50 percent of the members to 1 year terms. No member appointed under such paragraphs shall serve on the Council for more than 2 consecutive terms.

(d) CHAIRMAN AND VICE CHAIRMAN.--The President shall designate one of the members initially appointed to the Council as Chairman. Thereafter, the members of the Council shall annually elect one of their number as Chairman. The members of the Council shall also annually elect one of their members as Vice Chairman. No individual shall serve as Chairman or Vice Chairman for more than 2 consecutive years.

(e) EXECUTIVE DIRECTOR AND EMPLOYEES.--The Council shall appoint and fix the compensation of an Executive Director, who shall hire and fix the compensation of such additional employees as may be necessary to assist the Council in carrying out its functions. In hiring such additional employees, the Executive Director shall ensure that no individual hired has a conflict of interest with the responsibilities of the Council.

(f) FUNDING.--There is established in the Treasury of the United States a National Quality Performance Trust Fund, into which all funds received by the Council, through private donations or otherwise, shall be deposited. Amounts in such Trust Fund shall be available to the Council without further appropriation for the purpose of carrying out the functions of the Council under this Act.

(g) CONTRIBUTIONS.--The Council may not accept private donations from a single source in excess of $25,000 per year. Private donations from a single source in excess of $10,000 per year may be accepted by the Council only on approval of two-thirds of the Council.

(h) ANNUAL REPORT.--The Council shall annually submit to the President and the Congress a comprehensive and detailed report on--

(1) the progress in meeting the goals and priorities established by the Council;

(2) the Council's operations, activities, and financial condition;

(3) contributions to the Council from non-Federal

sources;

(4) plans for the Council's operations and activities for the future; and

(5) any other information or recommendations the Council considers appropriate.

Mr. VALENTINE. Is there further discussion?

[No response.]

Mr. VALENTINE. Any questions?

[No response.]

Mr. VALENTINE. If not, all in favor of adopting the amendment will indicate that by saying aye.

[Chorus of ayes.]

Mr. VALENTINE. Opposed, nay.

[No response.]

Mr. VALENTINE. The ayes have it. The amendment is adopted.

The amendment in your package designated as Amendment No. 3 will be offered by the Chair.

The amendment is as follows: ''On page 9, lines 15 through 17, strike the last sentence of paragraph (e) and insert in lieu thereof the following: 'Such funds shall be available for such purpose only to the extent that matching funds are received by the National Institute of Standards and Technology from sources outside the Federal Government.'''

The sentence being replaced by the amendment was written to make the statute match existing practice with regard to matching funds for the pilot program. In the opinion of some committee members, it does not accomplish its stated goal. Therefore, my amendment would return this section to the universally accepted language that our committee reported last year.

The amendment is offered without prejudice, and if more appropriate language can be developed by full committee, it will be offered at that time and will, of course, be subject to consideration by the full committee.

Let me say, finally, that this commitment was designed to meet certain objections raised by the ranking member of the full committee, Mr. Walker, and is offered at this time in the spirit of bipartisan effort to move this legislation through the process.

[The amendment offered by Mr. Valentine follows:]

********** INSERT **********

Amendment by Mr. Valentine

On page 9, lines 15 through 17, strike the last sentence of paragraph (e) and insert in lieu thereof:

"Such funds shall be made available for such purpose only to the extent that matching funds are received by the National Institute of Standards and Technology from sources outside the Federal Government."

Justification - The sentence being replaced by the amendment was written to make the statute match existing practice with regard to matching funds for the pilot program. In the opinion of some committee members, it does not accomplish its stated goal. Therefore, my amendment would return this section to the universally accepted language our committee reported last year. The amendment is offered without prejudice and if more appropriate language can be developed by full committee, it will be offered at that time.

Mr. VALENTINE. Are there any questions or any objections or any statements?

[No response.]

Mr. VALENTINE. If not, those in favor of the amendment will indicate that by saying aye.

[Chorus of ayes.]

Mr. VALENTINE. Those opposed, nay.

[No response.]

Mr. VALENTINE. The amendment is adopted.

Are there further amendments?

Mr. LEWIS. Mr. Chairman, I have two amendments for Mr. Campbell, who could not be with us today.

The first amendment basically--I know of no objection to it--looks at and increases the industrial competitiveness, and points out some problems with our outdated and misguided programs, basically. It is language for the report, Mr. Chairman.

[The report language offered by Mr. Campbell follows:]

xxxxxxxxxx INSERT xxxxxxxxxx

Report Language

Offered by Mr. Campbell

Industrial Competitiveness

Title II of this Act addresses Emerging Technologies R&D and competitiveness. However, it does not address all the issues related to United States competitiveness.

The Subcommittee finds that the ability of our country to compete in the international marketplace has diminished during the last two decades. While many factors have contributed to this decline, we believe that one stands out in particular–the high cost of capital.

Owing to outdated– and even misguided–budget, tax, trade, and antitrust policies, our firms are forced to pay more to borrow money than many of their international competitors. Our international competitors to earn profits quickly, and this, unfortunately, makes it much more difficult for us to implement the kinds of long term strategies that will help guarantee our competitive position in the world.

By promoting policies that encourage saving, investment, and a balanced budget, we can release our firms from their short term horizons. We also advocate policies that will give our firms greater flexibility to work together to achieve common objectives and more freedom to determine their own destinies. Likewise, an improved partnership between industry and our educational institutions will help prepare our students for a competitive, new world.

We believe that the following policies will improve the competitive position of our country.

The Research and Development Tax Credit should be made permanent and extended by including a percentage of all research expenses. Since our competitiveness is based on our ability to create, develop and market new products, a permanent R and D Credit will tell our firms that their investments will pay off.

In high-definition television, semiconductors, medical research, and in a host of other areas, stiff antitrust rules have made it difficult for our companies to engage in joint ventures that go further than merely engaging in research and development. This is unfortunate because additional cooperation among firms is vital if our industries are going to maintain and increase their profitability. We should allow our firms to form joint ventures to engage not only in research and development, but also production. At the same time, firms should be required to go through a sufficient notification procedure to enable the government to make sure that these firms will not also take part in any anti-competitive activities such as price-fixing.

Our students need additional and more specialized training to enable them to participate effectively in the work force. We can start by improving the partnership between industry and schools, for only by cooperating will these two groups be able to train workers to meet the challenges of the next century. Toward this end, a tax incentive for companies to lend their employees to schools and colleges to assist in teaching students and preparing course materials should be considered.

In conclusion, we believe that the recommendations can play a vital role in addressing the competitive position of our country. For only by addressing the competitive position in a coordinate manner will we be able to improve our competitive position.

Mr. VALENTINE. That language is included in the package before each member, I think?

Mr. LEWIS. Yes, sir.

Mr. VALENTINE. Is there any objection to that amendment?

[No response.]

Mr. VALENTINE. If not, those in favor, let it be known by saying aye.

[Chorus of ayes.]

Mr. VALENTINE. Those opposed, nay.

[No response.]

Mr. VALENTINE. The ayes have it and that amendment is adopted.

Mr. LEWIS. Mr. Chairman, I have another amendment by Mr. Campbell which is in the packet, which is ''additional views.'' What I would like to do at this point is just bring the amendment to the subcommittee members' attention and let Mr. Campbell offer this at the full committee.

Mr. VALENTINE. Is there any objection to that procedure?

[No response.]

Mr. VALENTINE. Without objection, so ordered.

Mr. MINETA. Mr. Chairman, just to enquire about that, is this the one that is related to the antitrust aspects?

Mr. LEWIS. Yes, that's correct.

Mr. MINETA. And it is not being offered here, but at the

Addition View for American Technology Preeminence Act

Offered by Mr. Campbell

Other factors related to U.S. competitiveness fall outside the Subcommittee's jurisdiction. Nevertheless, in order to be effective all of the factors must be on the table in order to have an effective U.S. competitiveness policy. Consequently, I wish to present some of these issues.

Takeover that drive only be tax benefits are detrimental to our economy. By eliminating these takeovers, we will allow takeovers to proceed on the merits, and thereby enable our firms to do a better job of focusing on long term productive planning. The solution lies in eliminating the difference in tax treatment between interest paid on debt and dividends paid on equity.

The essential elements of our labor laws were written over fifty year ago. There has not been a comprehensive overhaul since. The world – and the United States position in it – was quite different then.

One of the areas of greatest change has been in the way labor and management interact. The Depression era assumption of an antagonistic relationship has given way to cooperation and mutual education, in part following the lesson from Japan. Yet some aspects of our labor laws inhibit progress along this direction, most notably, section 8a2 of the Labor Management Relations Act. Concern over employers setting up sham unions created a rather stringent prohibition on employers working directly with employees on matters of working conditions.

A recent example of how labor and management can cooperate is the NUMI auto plant in Freemont, CA. The plant exists essentially at the sufferage of the UAW, which is willing to tolerate, at this location, a degree of direction management interaction without union involvement that might otherwise violate 8a2. Reforming 8a2 would enable all firms and unions to work together to achieve common goals.

Corporate management should be given a maximum degree of flexibility to decide whether they approve of a takeover offer guarantee that both the short and long term interests of their Security Act (ERISA) places excessive restrictions on the firms be forcing these managers to manage the affairs of their firms by forcing these managers to accept a takeover if the offer price is above the market price. This is an unfortunate rule because while a given offer price may be attractive, there are often many other issues that managers must take into consideration before they can agree to a transaction. This legislation would simply give managers the ability to take factors other than price into consideration when they evaluate takeover offers.

It is hard to induce investment in new products and technologies when investors run the risk of having their ideas pirated in another country. While Section 337 of our trade law provides some protection of our firms, it is cumbersome; markets can be lost during the time it takes to prosecute a case. Our bill corrects Section 337 by making it easier to exclude goods that violate our intellectual property laws.

full committee level?

Mr. LEWIS. It is just brought to the committee members' attention so that they can review it prior to full committee hearing on the bill.

Mr. MINETA. Very well. Thanks very much.

Mr. VALENTINE. Are there further amendments?

[No response.]

Mr. VALENTINE. Further discussion?

Mrs. MORELLA. Mr. Chairman, rather than an amendment, I would like to offer some report language to the American Technology Preeminence Act of 1991.

First of all, I want to commend you and Mr. Lewis for your leadership in this, and I am pleased to offer this report language, which you have before you.

As you know, the National Institute of Standards and Technology has been entrusted with the basic mission of enhancing American competitiveness in the world marketplace. The report language stresses several points. It has some excerpts from statements before our subcommittee by Department of Commerce and NIST, as well as representatives of important American corporations, stressing the importance of a generous funding level for new intramural programs. They have been extremely successful in ensuring and enhancing the competitiveness of our companies in the global marketplace. They need to continue to receive strong support from this subcommittee and the entire Congress.

Secondly, the report language stresses the fact that while funding for extramural programs has grown in the past several years at very significant levels, appropriations for NIST's intramural or core programs have not been as generous. So there is certainly a need for the intramural funding to keep pace with its extramural counterpart. Let me reiterate the fact that we have business and industry and Government all indicating how critically important the core program is, so we must do our part on that.

So basically it is simply saying that attention should be paid to both the intramural and the extramural program.

[The report langauge offered by Mrs. Morella follows:]

********** INSERT **********

Report Language
for
American Technology Preeminence Act of 1991

Offered by Mrs. Morella

NTIS Intramural Programs

The President's National Institute of Standards and Technology (NIST) budget request for fiscal year 1992 was $248 million for both intramural and extramural programs. This is an increase of 15 percent over the fiscal year 1991 appropriations of $215 million. Moreover, the Administration has indicated a desire to double the budget of NIST over the five year period beginning with 1990. The Committee agrees that the proposed doubling would make a major contribution to United States industrial competitiveness.

The heart of the NIST programs are those in the intramural area. NIST is the oldest national laboratory and the only laboratory with the express mission of aiding U.S. industry.

The importance of the intramural programs was described by several witnesses at the Subcommittee hearings. The following excerpts are from these hearings:

"NIST's intramural laboratory programs grew in real terms by less than 10% over the past fifteen years, while R&D spending by industry increased by 82% and the U.S. Government's overall R&D spending grew by 57%."
Dr. Robert M. White
Under Secretary of Commerce for Technology

"This funding request includes $201.8 million in intramural appropriations ...
It is designed to strengthen NIST research programs in support of U.S. industry in economically important areas such as electronics, advanced materials, computers, communications, industrial chemical technology, and manufacturing ...
in selected areas of public health and safety and the environment...
competition for resources has been intensified by the new extramural programs ...
we must realize that the extramural programs are both innovative and experimental requiring careful evaluation."
Dr. John W. Lyons, Director
National Institute of Standards and Technology

"I want to make clear at this point that when I talk about the need for doubling the NIST budget I am referring to its in-house, laboratory-based research and services. The first priority is to provide NIST with the resources required to allow it to continue to be a world-class laboratory in support of U.S. industry and government. This research base must be strong enough to support all of the other extended and expanded missions, or those new missions will surely crush the very capability which led policy makers to establish NIST in the first place ...
NIST intramural research program is a national jewel on which industry justifiably relies. The first priority of the committee should be to support NIST's

in-house research and services at a level substantially higher than it has been supported in past years ...

any new NIST assignments must also be accompanied by adequate new resources, not at the expense of the laboratory based programs."

Dr. John P. McTague
Vice President - Technical Affairs
Ford Motor Company

"Perhaps of greatest importance to American Society for Testing and Materials (ASTM)is the fact that the work of NIST provides research and technology upon which many ASTM standards are based. ASTM produces nearly 8,500 standards ...

ASTM's work would be materially hurt without the participation of the almost 250 scientists and engineers of the Institute in the work of our technical committees and without the basic research, reference materials, and advanced measurement techniques which NIST has developed and shares with us ...

I could cite to you almost innumerable examples of how NIST's research efforts have contributed to improving the quality and performance of U.S. products as well as their safety."

Joseph G. O'Grady
President - ASTM

The Committee concludes that the intramural programs valuable and their funding levels must be sufficient to allow the Agency to fulfill its goals. Therefore, the Subcommittee strongly recommends full funding for the intramural program in 1992.

Mr. VALENTINE. If anyone else has any comments about that, I would like to suspend this operation briefly while the Chair confers with some of the Chair's principal advisors.

We don't have any desire to be the least bit arbitrary, but we want to be sure that all members fully understand the language. Could we defer this as we did Mr. Rohrabacher's language?

Mrs. MORELLA. We may or, Mr. Chairman, you could work with the staff in between time to work out some language that would be acceptable to you and the ranking member. I appreciate it.

Mr. VALENTINE. Without objection, we will endeavor to do that.

But let me say to the members of the subcommittee that this will be in addition to what we have acted on here today, so the members of the subcommittee will have the opportunity to exercise their independent judgment with respect to the full committee.

Without objection, we will follow that procedure.

Are there other amendments, suggestions, questions, or speeches?

[No response.]

Mr. VALENTINE. If not, the Chair recognizes the gentleman from Florida for a motion.

Mr. LEWIS. Mr. Chairman, I move that the subcommittee report the bill as amended. Furthermore, I move to instruct the staff to prepare the subcommittee report, to make technical and conforming amendments, and that the chairman take all the necessary steps to bring the bill, Technology Administration Authorization for Fiscal Year 1992, before the full committee for consideration.

Mr. VALENTINE. You have heard the motion. Is there any discussion?

[No response.]

Mr. VALENTINE. If not, all in favor of the motion, let i be knownby saying aye.

[Chorus of ayes.]

Mr. VALENTINE. Those opposed, nay.

[No response.]

Mr. VALENTINE. The motion carries and the bill will be reported to the full committee.

That concludes this subcommittee's business.

Let me say to you before you depart, we do appreciate very, very much the participation of so many members at this markup. Thank you all so much. The subcommittee stands adjourned.

[Whereupon, at 12:25 p.m., the subcommittee adjourned, t reconvene at the call of the Chair.]

BEST AVAILABLE COPY

MARKUP OF H.R. 1989, THE AMERICAN TECHNOLOGY PREEMINENCE ACT

WEDNESDAY, MAY 1, 1991

U.S. House of Representatives,
Committee on Science, Space, and Technology,
Washington, D.C.

The committee met, pursuant to notice, at 10:07 a.m. in room 2318, Rayburn House Office Building, Hon. George E. Brown, Jr. [chairman of the committee] presiding.

The **Chairman**. The committee will come to order.

I recognize that we don't quite have a quorum yet, but if I don't have something to do, I'll start smoking a cigar, and you're all going to hate me for that.

This morning the committee is meeting to consider H.R. 1989, the American Technology Preeminence Act. This act represents the end product of over two years of work by the Committee on Science, Space and Technology.

Much of the preparatory work was done in the last Congress when more than 15 days of hearings pertaining to this legislation were held by either the full committee or the Subcommittee on Science, Research and Technology. An earlier version of this bill passed the House of Representatives last year.

Work has continued in this Congress under the able leadership of Chairman Valentine and ranking member Tom Lewis of our Subcommittee on Technology and Competitiveness. I wish to express my thanks to both of these gentlemen as well as the other members of the subcommittee for their hard work and vision in preparing the legislation for our consideration today.

It is hard to think of a more important topic than competitiveness for a committee with jurisdiction over science and technology to be considering today. Innovation is occurring at a record pace, yet, that pace is still increasing. The time for business as usual by either the Congress or by the private sector is long past. The longer we wait to come to grips with our weaknesses, the more severe the problems will be in the long run.

This bill is an important step in the right direction. It provides increased funding for key competitiveness programs in the Department of Commerce, including the Advanced Technology Program and the Regional Centers for Manufacturing Technology.

Through blue-ribbon panels, it begins the process of reforming government procurement to promote advanced technology and to learn why the cost of capital is so much more for United States firms than for some of our overseas competitors. The National Advisory Committee on Semiconductors is extended and a similar group is created to bring industry and government decision-makers together to consider the problems associated with high definition systems.

The National Academy of Engineering is asked to study the important topic of conformity assessment and how standards are used to keep U.S. products out of certain overseas markets. These are just a few of the many topics of importance contained in the bill that Mr. Valentine will discuss in more detail.

This bill has my own wholehearted support and I trust it will have the support of a majority of the committee.

[The prepared statement of Mr. Brown follows:]

Statement by Congressman George E. Brown

H.R. 1989: American Technology Preeminence Act

The American Technology Preeminence Act represents the end product of over two years of work by the Committee on Science, Space, and Technology. Much preparatory work was done last Congress when more than 15 days of hearings pertaining to this legislation were held by either the Full Committee or the Subcommittee on Science, Research, and Technology and an earlier version of this bill passed the House of Representatives. Work has continued this Congress under the able leadership of Chairman Tim Valentine and Ranking Republican Member Tom Lewis of our Subcommittee on Technology and Competitiveness. I wish to thank both gentlemen as well as the other members of the Subcommittee for their hard work and vision in preparing this legislation for our consideration today.

It is hard to think of a more important topic than competitiveness for a committee with jurisdiction over science and technology to be considering today. Innovation is occurring at a record pace, yet that pace is increasing. The time for business as usual by either the Congress or by the private sector is long past. The longer we wait to come to grips with our weaknesses, the more severe the problems will be in the long run.

This bill is an important step in the right direction. It provides increased funding for key competitiveness programs of the Department of Commerce including the Advanced Technology Program and the Regional Centers for Manufacturing Technology. Through blue ribbon panels it begins the process of reforming government procurement to promote advanced technology and to learn why cost of capital is so much more for United States firms than for some of our overseas competitors. The National Advisory Committee on Semiconductors is extended and a similar group is created to bring industry and government decisions makers together to consider the problems associated with high definition systems. The National Academy of Engineering is asked to study the important topic of conformity assessment and how standards are used to keep U.S. products out of certain overseas markets. These are just a few of the many topics of importance contained in the bill that Mr. Valentine will discuss in more detail. This bill for obvious reasons has my wholehearted support.

COMPETITIVENESS BILL SUMMARY

AMERICAN TECHNOLOGY PREEMINENCE ACT OF 1991

Title I. *This title authorizes each of the programs of the Technology Administration. For the activities of the Office of the Under Secretary For Technology, $6.5 million is authorized for FY 1991, which includes $1.3 million for the Office of the Under Secretary, $2.7 million for Technology Policy, $1.0 million for Japanese Technical Literature, $1.0 million for the Clearinghouse on State and Local Initiatives and $500,000 for the modernization of the National Technical Information Service. For FY 1992, $9.0 million is authorized which includes, $1.6 million for the Office of the Under Secretary, $3.4 million for Technology Policy, $1.5 million for Japanese Technical Literature, $1.0 million for the Clearinghouse on State and Local Initiatives, and $1.5 million is provided for the modernization of the National Technical Information Service. For the National Institute of Standards and Technology (NIST), the authorization levels for the intramural scientific and technical research and services activities are $166.2 million for FY 1991 and $211 million for FY 1992, and for the extramural industrial technology services program, $117 million for FY 1991 and $127.5 million for FY 1992, which includes $15 million in FY 1991 and $25 million in FY 1992 for Regional Centers for the Transfer of Manufacturing Technology with the assumption that new centers will be started each of the two fiscal years; $2 million in FY 1991 and $2.5 million in FY 1992 is provided for the State Technology Extension Program; and $100 million is authorized for each of the 1991 and 1992 fiscal years for the Advanced Technology Program. This title also provides start-up matching finds for a program to place U.S. standards experts in developing nations to make sure that those nation's standards codes permit the marketing of U.S.-designed products. The fire research and building technology programs are combined for administrative purposes only, with separate budget accounts to be maintained, and a report on the results of the combination is required. A provision authorizing NIST and the Federal Aviation Administration to undertake a joint research program to develop an all-fire resistant aircraft cabin interior has been added. The NIST Organic Act is amended to provide NIST with authority to manage its scientific and technical fellowship programs and to recruit and employ highly qualified foreign nationals who have advanced degrees from U.S. universities and have filed to become U.S. citizens. The National Advisory Commission on Semiconductors is extended through FY 1992.*

Title II. *This title is cited as the "Emerging Technologies and Advanced Technology Program Amendments Act of 1991 and provides statutory language for assistance to solve generic technology and manufacturing problems in emerging technology fields including high resolution information systems and advanced materials research and development, but specific spending levels are not designated for specific technologies. Conditions under which a company can participate in the Advanced Technology Program are set out. A comprehensive report is required 4 years after enactment of the law of the activities of the Advanced Technology Program.*

Title III. *This title makes the funding for the Federal Laboratory Consortium permanent, extends federal patent law to the legislative branch, and authorizes appropriated funds to carry out administrative responsibililties under the Malcolm Baldrige Quality Improvement Act.*

Title IV. *A Presidential Commission on Reducing Capital Costs for Emerging Technology is established to develop legislative recommendations to increase the competitiveness of U.S. industry by encouraging investment in quality, product and process improvements, and new product development and marketing. A report to the President and the Congress is required one year after enactment of the Act.*

Title V. *This title establishes a High Resolution Information Systems Board within the Office of Science and Technology Policy to increase the cooperation of Government and industry in high resolution information systems. This title strengthens the biennial OSTP report which identifies critical civilian technologies which will be important to the U.S. economy during ten years following the report. It also requires reports on quality, on competitive research, on international standards, and on coordination of high resolution information system purchases by the Government. A Commission on Research, Development, Technology Utilization, and Government Procurement Policy, which will make recommendations on how to change governmental purchasing law and procedures to ensure that emerging technologies are encouraged through these purchases, is established. This title also requires the Department of Commerce to study the feasibility of creating a Federal On-line Information Product Catalog to be an authoritative register of governmental information products and services disseminated by the Federal government and to assist agencies and the public in locating Federal government information. The National Academies are asked to undertake a review of U.S. activities related to testing and certification of products made for export.*

Title VI. *This title requires NIST to implement a voluntary accreditation program to be used in the evaluation and*

detection of lead in paint films, soil and dust, and to establish performance criteria and standards for lead paint encapsulants and strippers within 2 years of enactment of this Act.

II. SUMMARY AND LEGISLATIVE HISTORY OF BILL AS REPORTED

The Subcommittee on Technology and Competitiveness met on April 10, 1991 to consider an updated version of the American Technology Preeminence Act of 1990, which has been introduced by Members of the Committee on Science, Space, and Technology during the 101st Congress after a series of over twenty hearings related to the status of U.S. technological competitiveness in the world marketplace. After discussion of the bill, and a quorum being present, the Subcommittee ordered the bill reported, as amended, by an amendment in the nature of a substitute to the Full Committee on Science, Space, and Technology by voice vote.

A. Background and Need for Legislation

"There can no longer be any doubt that the United States faces a real and unrelenting technological threat – a threat that spans both commercial and military concerns," warned the Executive Committee of the Council on Competitiveness in a March 1990 letter to President Bush. "In markets from machine tools to semiconductors, U.S. industry has been battered by foreign competition. Indeed, in some cases, such as consumer electronics, foreign competitors have taken over entire industries that the United States pioneered and once dominated. The erosion of these industries has fueled huge trade deficits and created pressure to reduce the exchange value of the dollar," the Council continued. Indeed, decline in American technological preeminence has been repeatedly identified among the nation's most serious problems.

National attention began to focus on the issue of competitiveness as the U.S. faced a persistent and growing international trade deficit in the late 1970's. Spectacular economic growth in Pacific Rim nations and the more recent emergence of Central Europe as a potential market economy will continue to alter long-standing trade relations. In a world of lowered military confrontation, continued U.S. global influence will depend on economic might.

Both Presidents Carter and Reagan created Presidential level commissions to identify causes and possible solutions to our declining competitiveness, and over the past decade, many industry leaders have volunteered to serve on a variety of "blue ribbon" panels studying virtually every aspect of the issue. Congress addressed these concerns with the passage of the Omnibus Trade and Competitiveness Act of 1988, which incorporates many elements of an emerging national consensus.

There is now widespread agreement that American prosperity cannot be separated from technological preeminence, and that government policies play a crucial role – either positive or negative – in delineating the economic environment in which new technologies are developed and marketed. In September 1988, Dr. Robert M. White, President of the National Academy of Engineering, stated, "There is now a growing understanding of the essential role of the federal government in addressing the contextual issues of economic policy, tax policy, intellectual property protection, and legal frameworks that are needed to provide a favorable environment for investment, innovation, and increased productivity." During oversight hearings, the Committee also has repeatedly received testimony that government policies affecting procurement, the cost of capital, and tax and antitrust laws are often the factors which determine whether specific private sector technology development programs go forward, and high technology jobs are created and remain in the U.S.

Dr. Ian Ross, Chairman of the National Advisory Committee on Semiconductors, in March 1990 testified before the Subcommittee on Science, Research and Technology that *there is now general agreement that the U.S. faces a major problem in high technology and the government must be part of the solution. The business environment in the U.S., he warned, imposes fundamental disadvantages on American manufacturers. Foreign producers, in contrast, "enjoy advantages in ready access to low-cost patient capital for long-term investment, ... operate in a business environment hospitable to cooperative ventures that are not general practice here,..."*

While recognizing the primary responsibility of the private sector in commercial development, the Committee is convinced that a comprehensive national technology policy is urgently needed. The solutions to American competitiveness extend far beyond appropriate funding levels for government research and development, measures which were once thought to be sufficient. The economic environment in which American businesses operate has changed drastically in the last decade, and government recognition of that transformation is imperative.

In the 100th Congress, the Committee worked on legislation which has begun establishing the framework for a new technology policy. This legislation included Title V of the Omnibus Trade and Competitiveness Act of 1988 which transformed the National Bureau of Standards into the National Institute of Standards and Technology and establish the ATP; and the NIST authorization for FY 1989 which established the position of Under Secretary for Technology in the Department of Commerce. The American Technology Preeminence Act of 1991 continues this process of building the framework necessary for private enterprise successfully to develop and market new technologies, once again permitting products made in America to become widely sought after in world markets.

Therefore, the bill has three major purposes: 1) to make legislative changes to enhance competitiveness, and to establish a definition of a U.S. business to increase incentives for the creation of jobs within the U.S. and to remove legislative barriers to effective U.S. participation in world markets; 2) to pave the way for further reaching changes in areas including cost of capital and government high technology procurement; and 3) to strengthen the Technology Administration of the Department of Commerce to provide for more effective government participation in the solution to maintaining U.S. preeminence in technology. The bill is designed to aid the American economy across-the-board, not just one industry or technology.

B. Purpose of the Bill

The purpose of the bill is to authorize appropriations for the Department of Commerce's Technology Administration programs totaling $289,728,000 for FY 1991 and $347,500,000 for FY 1992, and includes funding for the Office of the Under Secretary for Technology, the National Institute of Standards and Technology, the Advanced Technology Program, and the National Technical Information Service (NTIS); to clarify and provide authorization levels for the Advanced Technology Program; and to give certain new authorities to the Director of the White House Office of Science and Technology Policy. The American Technology Preeminence Act also establishes a Presidential Commission on Reducing Capital Costs for Emerging Technology to recommend legislative changes to lower the cost of capital in developing technologies; a Commission on Research, Development Technology Utilization and Government Procurement Policy to recommend changes in government purchasing law; establishes a High Resolution Information Systems Board to increase the cooperation of Government and industry in high resolution information systems; strengthens the biennial OSTP report which identifies critical civilian technologies which will be important to the U.S. economy during the ten years following the report; and authorizes a number of studies to address technology policy issues. Recommended language and technical changes have also been made to the bill to conform it to present public law.

C. Administration Budget Request

For fiscal year 1992, the Administration has proposed $5 million for the Office of the Under Secretary for Technology, which represents an $800,000 increase over FY 1991 appropriated funds and $248 million for the National Institute of Standards and Technology, compared to $215 million in FY 1991, which includes $201.8 million for the traditional intramural laboratory research programs and $46.2 million for the extramural outreach programs mandated in the Trade Bill to help U.S. industry to become more competitive. Of the $46.2 million, the Advanced Technology Program has been frozen at the FY 1991 level of $35.9 million, the State Technology Extension Program, funded at $l.3 million in FY 1991, has been phased out, and the Manufacturing Technology Centers, funded at $ll.9 million in FY 1991, has been decreased to $l0.3 million. Other decreases totaling, $750,000, including -$600,000 less for the building and fire research centers, and a decrease of -$150,000 to phase out the non-energy-related inventions program.

D. Committee Actions

l. Technology Administration

For fiscal year 1991, the Subcommittee bill proposes $6.5 million for the Technology Administration, which includes $l.3 million for the Office of the Under Secretary, $2.7 million for Technology Policy, $l.0 million for the Japanese Technical Literature Program, $l.0 million for the Clearinghouse on State and local Initiatives on Productivity, Technology and Innovation, and $500,000 for the National Technical Information Service to carry out its modernization activities.

For fiscal year 1992, the Subcommittee draft bill proposes $9.0 million for the Technology Administration, which includes $6 million for the Office of the Under Secretary, $3.4 million for Technology Policy, $1.5 million for the Japanese Technical Literature Program, $l million for the Clearinghouse on State and Local Initiatives, and $l.5 million for the National Technical Information Service to carry out its modernization plan.

2. National Institute of Standards and Technology Intramural Programs

Section 104 of the bill proposes $l66.2 million for the intramural programs for fiscal year 1991, which is the FY 1990 appropriated level for these programs. For fiscal year 1992, $2ll million is proposed for the intramural programs. This reflects the concern of various Committee Members that NIST has been grossly underfunded over the years, given its major responsibilities for support of this Country's industrial base. During the 1980s, NIST programs have been frozen more often than not without adjustments for inflation, and in terms of real purchasing power they have shrunk significantly. NIST's metrology research provides the measurement base American business needs to manufacture the quality products now required to compete in the world marketplace. It also reflects the Administration's decision that NIST's long-term budget should double by 1996.

a. Electronics and Electrical Measurements

Section 104 of the bill provides funding for the ten major program areas of NIST. The area of electronics is authorized at $21,273,000 for FY 1991 and 34,000,000 for FY 1992. This line item supports the fundamental electronic technologies of semiconductors, magnetics, superconductors, optical fibers, microwave communications electrical power systems, and electrical measurement instrumentation. These technologies rely heavily on accurate measurements, and the funding increase is necessary to provide the U.S. industrial sector the assistance it needs to compete effectively in the world market. NIST provides measurement methods and national reference standards to support industrial R&D, quality control, and product application. One of the initiatives planned for FY 1992 is a further enhancement of the lightwave measurement technology, including measurement development for integrated circuits. The economic benefits to industry are expected to exceed $1 billion over the next ten years.

b. Manufacturing Engineering

This line item supports the U.S. mechanical engineering industry, including automobiles, commercial aircraft, and consumer electronics. Section 104 authorizes $8,266,000 for FY 1991 and $13,500,000 for FY 1992. Funding for this program will be dedicated to standards for connecting computerized design and fabrication systems between different manufacturers, control systems for robots, and factory automation. The additional funding for FY 1992 will be concentrated on developing an international data exchange standard and the intelligent machines research program, which will help bring a new generation of machines controlled by computer-aided design to life.

c. Chemical Science and Technology

The ability to make accurate chemical compositional measurements is a prerequisite for producing quality products in the energy, health care, materials processing and biotechnology industries. The funds authorized for this program are $18,617,000 and $22,000,000 for FY 1991 and FY 1992 respectively and includes measurement methods for DNA profiling, ultra-thin film sensors, and molecular surfaces of magnetic recording devices. The optical and electrochemical sensors developed by NIST researchers will be used by industry to make online measurements that significantly reduce the number of defectives and amount off waste created during manufacturing.

d. Physics

Section 104 authorizes $25,522,000 for FY 1991 and $27,000,000 for FY 1992 for the physics research at NIST. This research, which private industry is reluctant or unable to support, will provide the science base for future generations of measurement technology. NIST investigates the structure and dynamics of atoms and molecules, measurement and standards for different types of radiation, and the improvement of the accuracy and precision of time and frequency standards. One especially important program for FY 1992 is the development of a diode laser to replace conventional lasers for precision measurement.

e. Materials Science and Engineering

This line item, funding the Materials Science and Engineering Laboratory, is authorized $26,495,000 for FY 1991 and $30,000,000 for FY 1992. New developments in materials hold the future of such diverse industries as communications, construction, energy, and transportation. Currently, the annual U.S. shipments of advanced materials and the products made from them exceed $70 billion. NIST is concentrating on the scientific and measurement issues that will help develop process technologies that produce high quality advanced material products at reasonable cost. Advances in the development of ceramics, metal alloys, polymers, composites, and the new high temperature superconductors all leave new production and precision questions that this program will address.

f. Building and Fire Research

The construction industry in the U.S. totaled $432 billion in sales and employed 6.8 million people in 1989, while 6000 people and $9 billion were lost in fires. NIST conducts research in this area to provide a national focus to the localized fire safety industry and the technological capability to deal with the issues. Future programs include the formulation of seismic safety practices for water, power, gas and communication lines and a method of predicting the rate at which a fire will spread on the interior of a room. The authorized funding for the line item is $9,821,000 for FY 1991 and $12,300,000 for FY 1992 in Section 104 of the bill.

g. Computer Systems

Section 104 authorizes $11,819,000 for FY 1991 and $16,000,000 for FY 1992 for the National Computer Systems Laboratory. Research in this area supplies the federal government and the entire computer industry with improved standard techniques for protecting electronic financial transactions, standards to increase the portability of software between different databases and vendors, and criteria to safeguard information exchange in open electronic networks. The increased funding will be directed to initiatives such as protection from computer "viruses" and "worms" in accordance with the Computer Security Act of 1987 and acceleration in standards for an Integrated Services Digital Network that would allow simultaneous transmission of voice, text, images, and data over telephone lines.

h. Applied Mathematics and Scientific Computing

The Computing and Applied Mathematics Laboratory ensures that the best and most appropriate techniques in mathematical modeling, statistics, numerical analysis, and scientific computing are made available to NIST programs and collaborative industries. Future programs are dedicated to developing experimental designs for ceramic materials processing, mathematical models for growing alloy and semiconductor crystals, and efficient algorithms used in robotics and physical simulation. Section 104 authorizes $5,847,000 for FY 1991 and $6,500,000 for FY 1992 for this line item.

i. Technology Assistance

This line item provides the scientific and technical community of the United States with access to national and international standardization activities and supports various grant programs to strengthen America's manufacturing industries. The National Center for Standards and Certification Information is also funded through this program, providing technical assistance to government, industry and the public on standards-related issues affecting trade. NIST plans on providing information for trade negotiations with Mexico and the European Community in FY 1992. The funding authorized for this program is $8,978,000 for FY 1991 and $11,000,000 for FY 1992.

j. Research Support Activities

Research Support Activities provide high caliber scientists and engineers, computing support, and special facilities for NIST programs. The program is divided into five sub-programs that each plays a crucial role in promoting the development and application of science and technology to U.S. industries. The Computer Support program provides staffing, operation and support of the supercomputer and other computer equipment at NIST. Resources that enable NIST scientists to carry out duties and respond to new requirements given by the Administration and Congress are supplied by the Technical Competence Program. There is also a Postdoctoral Fellowship Program that attracts the top research scientists, provides a link with universities, and serves as a method of technology transfer to the general scientific community. Finally there is a Facilities Modifications and Improvements program and a Special Facilities: Cold Neutron Research Facility program that currently under construction. In addition, the Committee continues its authorization of the non-energy related inventions program. Section 104 of the bill authorizes $29,590,000 for

FY 1991 and $38,700,000 for FY 1992 to support these initiatives.

3. National Institute of Standards and Technology (NIST) Extramural Programs

In addition to the extensive intramural programs, NIST also provides unique opportunities for the involvement of U.S. companies in their extramural programs. The financial risks of research in advanced manufacturing techniques are, therefore, shared by both government and private industry. The extramural side of NIST is divided into three main programs that are authorized funds in Section 105 of the bill and are explained below.

a. Regional Centers for the Transfer of Manufacturing Technology

This line item funds the Manufacturing Technology Centers (MTC) that seek to improve American manufacturing competitiveness in over 355,000 small and medium U.S.-based firms. The MTCs maintain a close relationship with community and technical colleges to identify the companies and provide adequate training to complement the new technologies being introduced. The task for FY 1992 is to support the existing MTCs and to fund one or more new centers. The program is authorized $15,000,000 in FY 1991 and $25,000,000 in FY 1992.

b. State Technology Extension Program

Section 105 authorizes $2,000,000 for FY 1991 and $2,500,000 for FY 1992 for this program that expands technology transfer of advanced manufacturing techniques to smaller businesses according to more localized areas. The 1991 program is carried out under section 5121(d) of the Omnibus Trade and Competitiveness Act of 1988.

c. Advanced Technology Program

This program awards several multi-year grants to U.S. companies to research and develop generic technologies that are in a pre-competitive stage. The result is a cost-shared, industry-led effort that typically benefits the electronics, semiconductor, advanced manufacturing, and biotechnology industries. A portion of the research funds, under the Small Business Innovation Development Act of 1982, will go to the Department of Commerce's Small Business Innovation Research Program. The authorized funds total $100,000,000 per year for FY 1991 and FY 1992.

E. Comparison with Budget Request

[ADD CHART and text]

BUDGET SUMMARY: TECHNOLOGY ADMINISTRATION AUTHORIZATION
(In Thousands of Dollars)

Budget Activity	FY 1990 APPROP.	Administration FY 1991 APPROP.	Administration FY 1992 REQUEST	Subcommittee FY 1991 AUTH.	Subcommittee FY 1992 AUTH.
NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST)					
Intramural Program					
(Scientific & Technical Research & Services)					
Electronics & electrical engineering	16,197	21,273	33,595	21,273	34,000
Manufacturing engineering	6,233	8,266	12,617	8,266	13,500
Chemical science and technology	16,914	18,617	20,822	18,617	22,000
Physics	24,752	25,522	26,475	25,522	27,000
Materials science & engineering	23,157	26,495	28,671	26,495	30,000
Building & fire research	11,271	9,821	10,632	9,821	12,300
Computer systems	9,440	11,819	15,048	11,819	16,000
Applied math & scientific computing	5,599	5,847	6,088	5,847	6,500
Technology assistance	7,379	8,978	10,094	8,978	11,000
Research support activities	24,306	29,590	37,798	29,590	38,700
SUBTOTAL	145,248	166,228	201,840	166,228	211,000
Extramural Program					
(Industrial Technology Services)					
Advanced Technology Program	9,892	35,900	35,900	100,000	100,000
Manufacturing Technology Centers	7,419	11,900	10,300	15,000	25,000
State Technology Extension Program	1,286	1,300	0	2,000	2,500
SUBTOTAL	18,597	49,100	46,200	117,000	127,500
TOTAL NIST APPROPRIATIONS	163,845	215,328	248,040	283,228	338,500
Other Technology Admin.Programs:					
Office, Under Secretary Technology	3,297	3,500	4,236	4,000	5,000
Japanese Technical Literature Prog.	328	400	400	1,000	1,500
Clearinghouse on Productivity, Technology and Innovation	250	300	300	1,000	1,000
National Technical Information Service	0	0	0	500	1,500
NIST (from above)	163,845	215,328	248,040	283,228	338,500
GRAND TOTAL	167,720	219,528	252,976	289,728	347,500

[illegible]F081

HLC

The American Technology Preeminence Act of 1991, as Reported by the Subcommittee on Technology and Competitiveness, April 10, 1991

102D CONGRESS
1ST SESSION

H. R. ___

IN THE HOUSE OF REPRESENTATIVES

Mr. VALENTINE introduced the following bill; which was referred to the Committee on ____________

A BILL

To authorize appropriations for the National Institute of Standards and Technology and the Technology Administration of the Department of Commerce, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. SHORT TITLE.

This Act may be cited as the ``American Technology Preeminence Act of 1991''.

TITLE I--DEPARTMENT OF COMMERCE RESEARCH AND TECHNOLOGY

SEC. 101. SHORT TITLE.

This title may be cited as the ``Technology Administration Authorization Act of 1991''.

SEC. 102. STATEMENT OF POLICY.

Congress finds that in order to help United States industries to speed the development of new products and processes so as to maintain the economic competitiveness of the Nation, it is necessary to strengthen the programs and activities of the Department of Commerce's Technology Administration and National Institute of Standards and Technology.

SEC. 103. TECHNOLOGY ADMINISTRATION.

(a) FISCAL YEAR 1991.--There are authorized to be appropriated to the Secretary of Commerce (hereafter in this Act referred to as the ``Secretary''), to carry out the activities of the Under Secretary for Technology (hereafter in this Act referred to as the ``Under Secretary'') and the Assistant Secretary for Technology Policy, $6,500,000 for fiscal year 1991, which shall be available for the following line items:

(1) Office of the Under Secretary, $1,300,000.

(2) Technology Policy, $2,700,000.

(3) Japanese Technical Literature, $1,000,000.

(4) Clearinghouse on State and Local Initiatives on Productivity, Technology, and Innovation, $1,000,000.

(5) National Technical Information Service, $500,000 to carry out the modernization plan described in section 212(f)(3)(D) of the National Technical Information Act of 1988 (15 U.S.C. 3704b(f)(3)(D)).

(b) FISCAL YEAR 1992.--There are authorized to be appropriated to the Secretary, to carry out the activities of the Under Secretary and the Assistant Secretary for Technology Policy, $9,000,000 for fiscal year 1992, which shall be available for the following line items:

(1) Office of the Under Secretary, $1,600,000.

(2) Technology Policy, $3,400,000.

(3) Japanese Technical Literature, $1,500,000.

(4) Clearinghouse on State and Local Initiatives on Productivity, Technology, and Innovation, $1,000,000.

(5) National Technical Information Service, $1,500,000 to carry out the modernization plan described in section 212(f)(3)(D) of the National Technical Information Act of 1988 (15 U.S.C. 3704b(f)(3)(D)).

(c) OPERATING COSTS.--Operating costs for the National Technical Information Service associated with the acquisition, processing, storage, bibliographic control, and archiving of information and documents shall be recovered primarily through the collection of fees.

(d) REPORT AND CERTIFICATION TO CONGRESS.--Within 90 days after the date of enactment of this Act, the Secretary of Commerce shall submit to Congress a report which--

(1) describes the Department of Commerce's response to the Inspector General's Report No. ATD-024-0-001;

(2) includes a revised detailed modernization plan for the National Technical Information Service;

(3) contains a business plan for the National Technical Information Service which includes detailed profit and loss analysis for groups of products and services and for major market segments; and

(4) certifies that the National Technical Information Service has--

(A) employed a chief financial officer who is a certified public accountant with experience in the dissemination of scientific and technical information; and

(B) begun taking reasonable steps toward strengthening its accounting system in response to the Inspector General's report described in paragraph (1).

(e) TECHNICAL AMENDMENT.--Section 5422(a) of the Omnibus

Trade and Competitiveness Act of 1988 (15 U.S.C. 4603a(a)) and section 273(c)(4) of the National Defense Authorization Act for Fiscal Years 1988 and 1989 (15 U.S.C. 4603(c)(4)) are each amended by striking ``Economic Affairs'' and inserting in lieu thereof ``Technology''.

SEC. 104. NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY.

(a) FISCAL YEAR 1991.--(1) There are authorized to be appropriated to the Secretary, to carry out the intramural scientific and technical research and services activities of the National Institute of Standards and Technology (hereafter in this Act referred to as the ``Institute''), $166,228,000 for fiscal year 1991, which shall be available for the following line items:

(A) Electronics and Electrical Measurements, $21,273,000.

(B) Manufacturing Engineering, $8,266,000.

(C) Chemical Science and Technology, $18,617,000.

(D) Physics, $25,522,000.

(E) Materials Science and Engineering, $26,495,000.

(F) Building and Fire Research, $9,821,000.

(G) Computer Systems, $11,819,000.

(H) Applied Mathematics and Scientific Computing, $5,847,000.

(I) Technology Assistance, $8,978,000.

(J) Research Support Activities, $29,590,000.

(2)(A) Of the total of the amounts authorized under paragraph (1), $2,000,000 are authorized only for steel technology.

(B) Of the amount authorized under paragraph (1)(I)--

(i) $150,000 are authorized only for the evaluation of nonenergy-related inventions and related technology extension activities;

(ii) $250,000 are authorized only for Institute participation in the pilot program established under subsection (e); and

(iii) $1,700,000 are authorized only for the Institute's management of the extramural funding programs authorized under section 105.

(C) Of the total amount authorized under paragraph (1)(J), $7,223,000 are authorized only for the technical competence fund.

(b) FISCAL YEAR 1992.--(1) There are authorized to be appropriated to the Secretary, to carry out the intramural scientific and technical research and services activities of the Institute, $211,000,000 for fiscal year 1992, which shall be available for the following line items:

(A) Electronics and Electrical Measurements, $34,000,000.

(B) Manufacturing Engineering, $13,500,000.

(C) Chemical Science and Technology, $22,000,000.

(D) Physics, $27,000,000.

(E) Materials Science and Engineering, $30,000,000.

(F) Building and Fire Research, $12,300,000.

(G) Computer Systems, $16,000,000.

(H) Applied Mathematics and Scientific Computing, $6,500,000.

(I) Technology Assistance, $11,000,000.

(J) Research Support Activities, $38,700,000.

(2)(A) Of the total of the amounts authorized under paragraph (1), $2,000,000 are authorized only for steel technology.

(B) Of the amount authorized under paragraph (1)(I)--

(i) $500,000 are authorized only for the evaluation of nonenergy-related inventions and related technology extension activities;

(ii) $250,000 are authorized only for Institute participation in the pilot program established under subsection (e); and

(iii) $2,700,000 are authorized only for the Institute's management of the extramural funding programs authorized under section 105.

(C) Of the total amount authorized under paragraph (1)(J), $7,565,000 are authorized only for the technical competence fund.

(c) TRANSFERS.--(1) Funds may be transferred among the line items listed in subsection (a)(1) and among the line items listed in subsection (b)(1), so long as the net funds transferred to or from any line item do not exceed 10 percent of the amount authorized for that line item in such subsection and the Committee on Commerce, Science, and Transportation of the Senate and the Committee on Science, Space, and Technology of the House of Representatives are notified in advance of any such transfer.

(2) The Secretary may propose transfers to or from any line item listed in subsection (a)(1) or subsection (b)(1) exceeding 10 percent of the amount authorized for such line item, but such proposed transfer may not be made unless--

(A) a full and complete explanation of any such proposed transfer and the reason therefor are transmitted in writing to the Speaker of the House of Representatives, the President of the Senate, and the appropriate authorizing Committees of the House of Representatives and the Senate, and

(B) 30 calendar days have passed following the transmission of such written explanation.

(d) RELATION TO OTHER AUTHORIZATIONS.--Except for authorizations provided in the Omnibus Trade and Competitiveness Act of 1988 (Public Law 100-418; 102 Stat. 1448) and the Steel and Aluminum Energy Conservation and Technology Competitiveness Act of 1988 (15 U.S.C. 5101 et

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seq.), this Act contains the complete authorizations of appropriations for the Institute for fiscal year 1992.

(e) PILOT PROGRAM.--Pursuant to the authorizations contained in subsections (a)(1)(I) and (b)(1)(I), the Secretary is authorized to pay the Federal share of the cost of establishing and carrying out a pilot program under section 112 of the National Institute of Standards and Technology Authorization Act for Fiscal Year 1989 (15 U.S.C. 272 note). The purpose of the pilot program is to assist a country or countries that have requested assistance from the United States in the development of comprehensive industrial standards by providing the continuous presence of United States personnel on-site for a period of 2 or more years to provide such assistance and by providing, as necessary, additional technical support from within the Institute. Such funds shall be made available for such purpose only to the extent that matching funds are received by the National Institute of Standards and Technology from sources outside the Federal Government.

(f) CONSTRUCTION OF FACILITIES.--Section 14 of the National Institute of Standards and Technology Act (15 U.S.C. 278d) is amended by striking ``herein:'' and all that follows, and inserting in lieu thereof ``herein.''.

(g) FIRE AND BUILDING PROGRAMS.--The fire research and building technology programs of the Institute shall be combined for administrative purposes only, and separate budget accounts for fire research and building technology shall be maintained. No later than December 31, 1991, the Secretary, acting through the Director of the Institute, shall report to Congress on the results of the combination, on efforts to preserve the integrity of the fire research and building technology programs, on the long-range basic and applied research plans of the two programs, on procedures for receiving advice on fire and earthquake research priorities from constituencies concerned with public safety, and on the relation between the combined program at the Institute and the United States Fire Administration.

(h) AIRCRAFT FIRE RESEARCH.--(1) The Secretary, acting through the Director of the Institute, and the Administrator of the Federal Aviation Administration shall jointly prepare a plan for a research program to develop the fire technology and materials necessary for the development of an all fire resistant aircraft cabin interior. Such plan shall include funding requirements, a brief description of the necessary research projects, and a schedule for completion of each such research project, and shall be submitted to the Congress within 1 year after the date of enactment of this Act.

(2) Subject to the availability of appropriations, the Secretary, acting through the Director of the Institute, and the Administrator of the Federal Aviation Administration

shall jointly carry out the research program described in the plan prepared under paragraph (1).

(i) EDUCATIONAL PROGRAMS.--(1) Section 18 of the National Institute of Standards and Technology Act (15 U.S.C. 278g-1)) is amended by striking the period at the end of the first sentence and inserting in lieu thereof ``, and to United States citizens for research and technical activities on Institute programs.''.

(2) Section 17 of the National Institute of Standards and Technology Act (15 U.S.C. 278g) is amended by adding at the end the following new subsection:

``(d) For any scientific and engineering disciplines for which there is a shortage of suitably qualified and available United States citizens and nationals, the Secretary is authorized to recruit and employ in scientific and engineering fields at the Institute foreign nationals who have been lawfully admitted to the United States for permanent residence under the Immigration and Nationality Act and who intend to become United States citizens. Employment of a person under this paragraph shall not be subject to the provisions of title 5, United States Code, governing employment in the competitive service, or to any prohibition in any other Act against the employment of aliens, or against the payment of compensation to them.''.

SEC. 105. EXTRAMURAL PROGRAMS OF THE INSTITUTE.

(a) FISCAL YEAR 1991.--In addition to any sums otherwise authorized under this Act, there are authorized to be appropriated to the Secretary, to carry out the extramural industrial technology services programs of the Institute created under sections 25, 26, and 28 of the National Institute of Standards and Technology Act (15 U.S.C. 278k, 278l, and 278n), $117,000,000 for fiscal year 1991, which shall be available for the following line items:

(1) Regional Centers for the Transfer of Manufacturing Technology, $15,000,000.

(2) State Technology Extension Program (carried out under section 5121(d) of the Omnibus Trade and Competitiveness Act of 1988), $2,000,000.

(3) Advanced Technology Program, $100,000,000.

(b) FISCAL YEAR 1992.--In addition to any sums otherwise authorized under this Act, there are authorized to be appropriated to the Secretary, to carry out the extramural industrial technology services programs of the Institute created under sections 25, 26, and 28 of the National Institute of Standards and Technology Act (15 U.S.C. 278k, 278l, and 278n), $127,500,000 for fiscal year 1992, which shall be available for the following line items:

(1) Regional Centers for the Transfer of Manufacturing Technology, $25,000,000.

(2) State Technology Extension Program, $2,500,000.

(3) Advanced Technology Program, $100,000,000.

(c) LIMITATION.--No funds are authorized under this section for any project under the extramural programs of the Institute which have not been competitively reviewed through the merit review processes required by the National Institute of Standards and Technology Act (15 U.S.C. 271 et seq.).

(d) AMENDMENTS TO EXTENSION PROGRAM.--Section 5121(b) of the Omnibus Trade and Competitiveness Act of 1988 (15 U.S.C. 2781 note) is amended by striking paragraph (5).

(e) ADVISORY COMMITTEE.--Section 5142(f) of the Omnibus Trade and Competitiveness Act of 1988 (15 U.S.C 4632(f)) is amended by striking ``and 1990'' and inserting in lieu thereof ``1990, 1991, and 1992''.

SEC. 106. SALARY ADJUSTMENTS.

In addition to any sums otherwise authorized by this Act, there are authorized to be appropriated to the Secretary for fiscal years 1991 and 1992 such additional sums as may be necessary to make any adjustments in salary, pay, retirement, and other employee benefits which may be provided for by law.

SEC. 107. AVAILABILITY OF APPROPRIATIONS.

Appropriations made under the authority provided in this Act shall remain available for obligation, for expenditure, or for obligation and expenditure for periods specified in the Acts making such appropriations.

SEC. 108. BUY-AMERICAN PROVISIONS.

(a) RESTRICTIONS ON CONTRACT AWARDS.--No contract or subcontract made with funds authorized under this title may be awarded for the procurement of an article, material, or supply produced or manufactured in a foreign country whose government unfairly maintains in government procurement a significant and persistent pattern or practice of discrimination against United States products or services which results in identifiable harms to United States businesses, as identified by the President pursuant to subsection (g)(1)(A) of section 305 of the Trade Agreements Act of 1979 (19 U.S.C. 2515(g)(1)(A). Any such determination shall be made in accordance with such section 305.

(b) PROHIBITION AGAINST FRAUDULENT USE OF ``MADE IN AMERICA'' LABELS.--If it has been finally determined by a court or a Federal agency that any person intentionally affixed a label bearing a ``Made in America'' inscription, or an inscription with the same meaning, to any product sold in or shipped to the United States that is not made in the United States, that person shall be ineligible to receive any contract or subcontract from the Department of Commerce, pursuant to the debarment, suspension, and ineligibility procedures in subpart 9.4 of chapter 1 of title 48, Code of Federal Regulations.

(c) BUY-AMERICAN REQUIREMENT.--(1) The Secretary is authorized to award to a domestic firm a contract for the purchase of goods that, under the use of competitive procedures, would be awarded to a foreign firm, if--

(A) the final product of the domestic firm will be completely assembled in the United States;

(B) when completely assembled, more than 50 percent of the final product of the domestic firm will be domestically produced; and

(C) the difference between the bids submitted by the foreign and domestic firms is not more than 6 percent.

(2) This subsection shall not apply to the extent to which--

(A) in the opinion of the Secretary, after taking into consideration international obligations and trade relations, such applicability would not be in the public interest;

(B) in the opinion of the Secretary, after consultation with the Secretary of Defense, compelling national security considerations require otherwise; or

(C) the President determines that such an award would be in violation of the General Agreement on Tariffs and Trade or an international agreement to which the United States is a party.

(3) This subsection shall apply only to contracts made for which--

(A) amounts are authorized by this title to be made available; and

(B) solicitations for bids are issued after the date of enactment of this Act.

(4) The Secretary, before January 1, 1993, shall report to the Congress on contracts covered under this subsection--

(A) entered into with foreign firms pursuant to a determination made under paragraph (2) of this subsection; and

(B) awarded to domestic firms pursuant to paragraph (1) of this subsection, in fiscal years 1991 and 1992.

(5) For purposes of this subsection--

(A) the term ``domestic firm'' means a business entity that is incorporated in the United States and that conducts business operations in the United States; and

(B) the term ``foreign firm'' means a business entity not described in subparagraph (A).

TITLE II--ADVANCED TECHNOLOGY PROGRAM AMENDMENTS

SEC. 201. EMERGING TECHNOLOGIES RESEARCH AND DEVELOPMENT.

(a) SHORT TITLE.--This title may be cited as the ``Emerging Technologies and Advanced Technology Program Amendments Act of 1991''.

(b) FINDINGS AND PURPOSES--(1) The Congress finds that--

(A) technological innovation and its profitable inclusion in commercial products are critical components of the ability of the United States to raise the living standards of Americans and to compete in world markets;

(B) maintaining viable United States-based high technology industries is vital to both the national security and the economic well-being of the United States;

(C) the Department of Commerce has reported that the United States is losing or losing badly, relative to Japan and Europe, in many important emerging technologies and risks losing much of the $350 billion United States market and $1 trillion world market expected to develop by the year 2000 for products based on emerging technologies;

(D) it is in the national interest for the Federal Government to encourage and, in selected cases, provide limited financial assistance to industry-led private sector efforts to increase research and development in economically critical areas of technology;

(E) joint ventures are a particularly effective and appropriate way to pool resources to conduct research that no single company is likely to undertake but which will create new generic technologies that will benefit an entire industry and the welfare of the Nation;

(F) it is vital that industry within the United States attains a leadership role and capability in development, design, and manufacturing in fields such as high-resolution information systems, advanced manufacturing, and advanced materials; and

(G) the Advanced Technology Program, established under section 28 of the National Institute of Standards and Technology Act (15 U.S.C. 278n), is the appropriate vehicle for the United States Government to provide limited assistance to joint development within the United States of new high technology capabilities in fields such as high-resolution information systems, advanced manufacturing technology, and advanced materials, and can help encourage United States industry to work together on problems of mutual concern.

(2) The purposes of this section are--

(A) to strengthen the Advanced Technology Program created under section 28 of the National Institute of Standards and Technology Act (15 U.S.C. 278n), and to provide improved guidelines for the allocation of Advanced Technology Program funds appropriated under the authorizations contained in section 105 of this Act;

(B) to promote and assist in the development of advanced technologies and the generic application of such technologies to civilian products, processes, and services;

(C) to improve the competitive position of United States industry by supporting industry-led research and development projects in areas of emerging technology which have substantial potential to advance the economic well-being and national security of the United States, such as high-resolution information systems, advanced manufacturing technology, and advanced materials; and

(D) to support projects that range from idea exploration to prototype development and address long-term, high-risk areas of technological research, development, and application that are not otherwise being adequately developed by the private sector, but are likely to yield important benefits to the Nation.

(c) ADVANCED TECHNOLOGY PROGRAM.--Section 28 of the National Institute of Standards and Technology Act (15 U.S.C. 278n) is amended--

(1) in subsection (b)(1)(B), by inserting ``through grants, cooperative agreements, or contracts'' after ``such joint ventures'';

(2) in subsection (b)(2), by inserting ``provide grants to and'' before ``enter into contracts'';

(3) by amending subsection (d)(2) to read as follows:

``(2) In the case of joint ventures, the Program shall not make an award unless the award will facilitate the formation of a joint venture or the initiation of a new research and development project by an existing joint venture.'';

(4) in subsection (d)(3), by striking ``cooperative agreement'' both places it appears and inserting in lieu thereof ``award'';

(5) by amending subsection (d)(7) to read as follows:

``(7) Each agreement with any business or joint venture that receives an award under this section shall specify a test, as mutually agreed to by the Secretary and the recipient, for determining whether the venture or project shall be deemed to have been a commercial success and providing that in such event there will be appropriate recoupment to the Federal Government. Such recoupment shall not exceed the principal amount, with reasonable interest, of any monetary awards provided to such recipient under the Program. The Secretary shall issue regulations establishing guidelines for agreement provisions stating the circumstances under which a venture or project will be found to be a commercial success and the general procedures and terms for recoupment in such cases.'';

(6) by adding at the end of subsection (d) the following new paragraphs:

``(10) A company shall be eligible to receive financial assistance under this section only if--

``(A) the Secretary finds that the company's participation in the Program would be in the economic interest of the United States, as evidenced by investments in the United States in research, development, and manufacturing (including, for example, the manufacture of major components or subassemblies in the United States); significant contributions to employment in the United States; and agreement with respect to any technology arising from assistance provided under this section to promote the manufacture within the United States of products resulting from that technology (taking into account the goals of promoting the competitiveness of United States industry), and to procure parts and materials from competitive suppliers; and

``(B) either--

``(i) the company is a United States-owned company; or

``(ii) the Secretary finds that the company has a parent company which is incorporated in a country which affords to United States-owned companies opportunities, comparable to those afforded to any other company, to participate in any joint venture similar to those authorized under this Act; affords to United States-owned companies local investment opportunities comparable to those afforded to any other company; and affords adequate and effective protection for the intellectual property rights of United States-owned companies.

"(11) Grants, contracts, and cooperative agreements under this section shall be designed to support projects which are high risk and which have the potential for eventual substantial widespread commercial application. In order to receive a grant, contract, or cooperative agreement under this section, a research and development entity shall demonstrate to the Secretary the requisite ability in research and technology development and management in the project area in which the grant, contract, or cooperative agreement is being sought.

"(12)(A) Title to any intellectual property arising from assistance provided under this section shall vest in a company or companies incorporated in the United States. The United States may reserve a nonexclusive, nontransferable, irrevocable paid-up license, to have practiced for or on behalf of the United States, in connection with any such intellectual property, but shall not, in the exercise of such license, publicly disclose proprietary information related to the license. Title to any such intellectual property shall not be transferred or passed, except to a company incorporated in the United States, until the expiration of the first patent obtained in connection with such intellectual property.

"(B) For purposes of this paragraph, the term 'intellectual property' means an invention patentable under title 35, United States Code, or any patent on such an invention.

"(C) Nothing in this paragraph shall be construed to prohibit the licensing to any company of intellectual property rights arising from assistance provided under this section.";

(7) by amending subsection (e) to read the follows:

"(e) The Secretary may, 30 days after notice to Congress, suspend a company or joint venture from receiving continued assistance under this section if the Secretary determines that the company, the country of incorporation of the company or a parent company, or the joint venture has failed to satisfy any of the criteria set forth in subsection (d)(10), and that it is in the national interest of the United States to do so."; and

(8) by inserting after subsection (e) the following new subsections:

"(f) When reviewing private sector requests for Department of Commerce assistance to proposed joint ventures, and when monitoring the progress of assisted joint ventures, the Secretary shall, as appropriate, coordinate with the Secretary of Defense and other senior Federal officials to ensure cooperation and coordination in Federal technology programs and to avoid unnecessary duplication of effort. The Secretary is authorized to work with the Secretary of Defense and other appropriate Federal officials to form interagency working groups or special project offices to coordinate Federal technology activities.

``(g) In order to analyze the need for and value of joint ventures in specific technical fields, to evaluate any joint ventures requesting the Secretary's assistance, or to monitor the progress of any joint venture which receives Federal funds pursuant to the authorizations contained in this section, the Secretary, the Under Secretary, and the Director may organize and seek advice from such industry advisory committees as they consider useful and appropriate.

``(h) Up to 10 percent of the funds appropriated for carrying out this section may be used for standards development and technical activities by the Institute in support of the purposes of this section.

``(i) As used in this section--

``(1) the term 'high-resolution information systems' means equipment and techniques required to create, transmit, receive, display, process, record, store, recover, and play back high resolution images and accompanying sound;

``(2) the term 'advanced manufacturing technology' means numerically-controlled machine tools, robots, automated process control equipment, computerized flexible manufacturing systems, associated computer software, and other technology for improving manufacturing and industrial processes;

``(3) the term `advanced materials' means a field of research including the study of composites, ceramics, metals, polymers, superconducting materials, materials produced through biotechnology, and materials production technologies, including coated systems, that provide the potential for significant advantages over existing materials;

``(4) the term `joint venture' means any group of activities, including attempting to make, making, or performing a contract, by two or more persons for the purpose of--

``(A) theoretical analysis, experimentation, or systematic study of phenomena or observable facts;

``(B) the development or testing of basic engineering techniques;

``(C) the extension of investigative finding or theory of a scientific or technical nature into practical application for experimental and demonstration purposes, including the experimental production and testing of models, prototypes, equipment, materials, and processes;

``(D) the collection, exchange, and analysis of research information;

``(E) the production of any product, process, or service; or

``(F) any combination of the purposes specified in subparagraphs (A), (B), (C), (D), and (E),

and may include the establishment and operation of facilities for the conducting of research, the conducting of such venture on a protected and proprietary basis, and the prosecuting of applications for patents and the granting of licenses for the results of such venture;

``(5) the term `United States-owned company' means a company that has majority ownership or control by individuals who are citizens of the United States; and

``(6) the term `foreign-owned company' means a company other than a United States-owned company.''.

(d) EFFECTIVE DATE.--The amendments in subsection (c) shall take effect immediately upon enactment; however, the amendments shall not apply to applications submitted in response to the Federal Register Invitation for Proposals dated July 24, 1990, or awards or other assistance granted pursuant to that notice.

(e) MANAGEMENT COSTS.--Section 2 of the National Institute of Standards and Technology Act (15 U.S.C. 272) is amended by adding at the end thereof the following new subsection--

``(d) In carrying out the extramural funding programs of the Institute, including the programs established under sections 25, 26, and 28 of this Act, the Secretary may retain reasonable amounts of any funds appropriated pursuant to authorizations for these programs in order to pay for the Institute's management of these programs.''.

(f) COMPREHENSIVE REPORT.--The Secretary of Commerce shall, not later than 4 years after the date of enactment of this Act, submit to each House of the Congress and the President a comprehensive report on the results of the Advanced Technology Program established under section 28 of the National Institute of Standards and Technology Act (15 U.S.C. 278n), including any activities in the areas of high-resolution information systems, advanced manufacturing technology, and advanced materials.

TITLE III--AMENDMENTS TO THE STEVENSON-WYDLER TECHNOLOGY INNOVATION ACT OF 1980

SEC. 301. FEDERAL LABORATORY CONSORTIUM.

(a) Section 11(e)(7) of the Stevenson-Wydler Technology Innovation Act of 1980 (15 U.S.C. 3710(e)(7)) is amended--

(1) in subparagraph (A), by striking ``a fiscal year referred to in subparagraph (B)(ii)'' and inserting in lieu thereof ``any fiscal year''; and

(2) by amending subparagraph (B) to read as follows:

``(B) A transfer shall be made by any Federal agency under subparagraph (A), for any fiscal year, only if the amount so transferred by that agency (as determined under such subparagraph) would exceed $10,000.''.

(b) Section 11(e)(8) of the Stevenson-Wydler Technology Innovation Act of 1980 (15 U.S.C. 3710(e)(8)) is repealed.

SEC. 302. COOPERATIVE RESEARCH AND DEVELOPMENT AGREEMENTS.

(a) Section 12(d)(1) of the Stevenson-Wydler Technology Innovation Act of 1980 (15 U.S.C. 3710a(d)(1)) is amended by inserting ``intellectual property,'' after ``equipment,'' both places it appears.

(b) Within 6 months after the date of enactment of this Act, the Secretary shall report to the Congress on the advisability of authorizing a new form of cooperative research and development agreement which would permit Federal contributions of funds.

SEC. 303. DEFINITION OF FEDERAL AGENCY.

Section 4(8) of the Stevenson-Wydler Technology Innovation Act of 1980 (15 U.S.C. 3703(8)) is amended by inserting ``, as well as any agency of the legislative branch of the Federal Government'' after ``of such title''.

SEC. 304. QUALITY IMPROVEMENT.

The Secretary is authorized to use appropriated funds to cover the cost of the Malcolm Baldrige National Quality Award program to the extent such funds are needed in addition to the funds specified under section 17(f) of the Stevenson-Wydler Technology Innovation Act of 1980 (15 U.S.C. 3711a(f)).

SEC. 305. UNDER SECRETARY.

Section 5(c) of the Stevenson-Wydler Technology Innovation Act of 1980 (15 U.S.C. 3704(c) is amended--

(1) by redesignating paragraphs (13) and (14) as paragraphs (14) and (15), respectively; and

(2) by inserting after paragraph (12) the following new paragraph:

``(13) serve as a focal point for discussions among United States companies on topics of interest to industry and labor, including discussions regarding manufacturing and discussions regarding emerging technologies;''.

TITLE IV--NATIONAL COMMISSION ON REDUCING CAPITAL COSTS FOR EMERGING TECHNOLOGY

SEC. 401. NATIONAL COMMISSION ON REDUCING CAPITAL COSTS FOR EMERGING TECHNOLOGY.

(a) ESTABLISHMENT AND PURPOSE.--There is established a National Commission on Reducing Capital Costs for Emerging Technology (hereafter in this section referred to as the ``Commission''), for the purpose of developing recommendations to increase the competitiveness of United States industry by encouraging investments in research, the development of new process and product technologies, and the production of those technologies.

(b) ISSUES.--The function of the Commission shall be to address the following issues:

(1) How has the overall cost of capital paid by United States companies differed during the past decade from that paid by companies in other industrial economies such as Germany, Japan, and the United Kingdom?

(2) To what extent has the cost of capital faced by technology companies differed from the overall cost of capital in each of these nations during the same period?

(3) To what extent do high capital costs in general inhibit investment in projects with long-term payoffs, such as the development and commercialization of new technology?

(4) To what extent does the structure of the financial services industry in the United States affect the flow of capital to advanced technology investment, and to what extent do current practices in the equity markets raise the cost of capital and inhibit the availability of capital to fund research and development, purchase advanced manufacturing equipment, and fund other investments necessary to commercialize advanced technology?

(5) In what ways to Government regulations influence

the cost of capital in the United States?

(6) To what extent have national differences in capital costs facilitated the foreign acquisition of technology-based United States companies?

(7) What macroeconomic and other policies would promote greater investment in advanced manufacturing techniques, in research and development, and in other activities necessary to commercialize and produce new technologies?

(8) What specific policies should the Federal Government follow in order to reduce the cost of capital for United States companies to levels that are near parity with those faced by the Nation's principal trading partners?

(c) MEMBERSHIP.--(1) The Commission shall be composed of 9 members who are eminent in such fields as advanced technology, manufacturing, finance, and international economics and who are appointed as follows:

(A) 3 individuals appointed by the President, one of whom shall be the Vice President and shall chair the Commission.

(B) 3 individuals appointed by the Speaker of the House of Representatives, 1 of whom shall be appointed upon the recommendation of the minority leader of the House of Representatives.

(C) 3 individuals appointed by the President pro tempore of the Senate, 2 of whom shall be appointed upon the recommendation of the majority leader of the Senate and 1 of whom shall be appointed upon the recommendation of the minority leader of the Senate.

(2) Each member shall be appointed for the life of the Commission. A vacancy in the Commission shall be filled in the manner in which the original appointment was made.

(d) PROCEDURES.--(1) The chairman shall call the first meeting of the Commission within 90 days after the date of enactment of this Act.

(2) Recommendations of the Commissions shall require the approval of three-quarters of the members of the Commission.

(3) The Commission may use such personnel detailed from Federal agencies as may be necessary to enable it to carry out its duties.

(4) Members of the Commission, other than full-time employees of the Federal Government, while attending meetings of the Commission while away from their homes or regular places of business, shall be allowed travel expenses in accordance with subchapter I of chapter 57 of title 5, United States Code.

(e) REPORTS.--The Commission shall, within 1 year after the date of enactment of this Act, submit to the President and Congress a report containing legislative and other recommendations with respect to the issues addressed under subsection (b).

(f) CONSULTATION.--The Commission shall consult, as appropriate, with the Commission on Technology and Procurement established by section 504 of this Act.

(g) TERMINATION.--The Commission shall terminate 6 months after the submission of its report under subsection (e).

(h) AUTHORIZATION OF APPROPRIATIONS.--There are authorized to be appropriated to carry out this section such sums as may be necessary for the fiscal years 1991 and 1992.

TITLE V--STUDIES AND REPORTS

SEC. 501. HIGH-RESOLUTION INFORMATION SYSTEMS ADVISORY BOARD.

(a) ESTABLISHMENT AND PURPOSE.--The Director of the Office of Science and Technology Policy shall establish within that office a High-Resolution Information Systems Advisory Board (hereafter in this section referred to the ``Board´´) to monitor and, as appropriate, foster the development of United States-based high-resolution information systems industries.

(b) DEFINITION.--As used in this title, the term ``high-resolution information systems´´ means the equipment and techniques required to create, store, recover, and play back high-resolution images and accompanying sound.

(c) FUNCTIONS.--The Board shall--

(1) collect and analyze information on the range of

factors which will determine whether United States-based high-resolution information systems industries will develop and become competitive, including such factors as technology policies, specialized financial problems, international standards and foreign trade practices, Federal regulations and procurement policies, and licensing practices;

(2) identify areas where appropriate cooperation between the Federal Government and the private sector, including Government support for industry-led joint research and development ventures, would enhance United States industrial competitiveness in this area, and provide advice and guidance for such cooperative efforts;

(3) provide guidance on what Federal policies and practices, particularly in such areas as procurement and the transfer of federally-funded research, are necessary to help establish United States-based high-resolution information systems industries;

(4) provide advice on the coordination of Federal defense and civilian activities to maximize and assist with the transfer of technologies in the field of high-resolution information systems into commercial products; and

(5) generally develop recommendations for guiding Federal agency activities related to the development of

United States-based high-resolution information systems industries.

(d) MEMBERSHIP AND PROCEDURES.--(1)(A) The Board shall be composed of 13 members, 7 of whom shall constitute a quorum.

(B) The Director of the Office of Science and Technology Policy, the Secretary, the Director of the Defense Advanced Research Projects Agency, and the Administrator of the National Aeronautics and Space Administration, or their designees, shall serve as members of the Board.

(C) The President, acting through the Director of the Office of Science and Technology Policy, within 90 days after the date of enactment of this Act, shall appoint as additional members of the Board--

(i) 5 members from the private electronics manufacturing sector, drawn from such sectors as semiconductors, display equipment, computers, consumer electronics, and telecommunications, with 1 member also representing labor;

(ii) 3 members from the private nonmanufacturing sector, including 1 representative from the transmission delivery systems sector and 2 representatives drawn from such areas as the software industry, the entertainment industry, and the investment community; and

(iii) 1 member from academia.

At least 1 member appointed under this subparagraph shall be from small business.

(2) The Director of the Office of Science and Technology Policy or the Director's designee shall chair the Board.

(3) The chairman shall call the first meeting of the Board within 30 days after the appointment of members is completed.

(4) The Board may use such personnel detailed from Federal agencies as may be necessary to enable it to perform its functions.

(5) Members of the Board, other than full-time employees of the Federal Government, while attending meetings of the Board or otherwise performing duties of the Board while away from their homes or regular places of business, shall be allowed travel expenses in accordance with subchapter I of chapter 57 of title 5, United States Code.

(6) The Board shall submit to the President and Congress a report of its activities once every year after its establishment.

(e) AUTHORIZATION OF APPROPRIATIONS.--There are authorized to be appropriated to carry out this section such sums as may be necessary for the fiscal years 1991 and 1992.

SEC. 502. MAJOR SCIENCE AND TECHNOLOGY PROPOSALS.

(a) REPORT.--The National Science and Technology Policy, Organization, and Priorities Act of 1976 is amended by adding at the end of title II the following new section:

``MAJOR SCIENCE AND TECHNOLOGY PROPOSALS

``SEC. 209. The Director shall monitor and report annually to Congress on each major science and technology project in which more than one country is participating and which has a total estimated cost greater than $1,000,000,000.''.

SEC. 503. BIENNIAL NATIONAL CRITICAL TECHNOLOGIES REPORT AMENDMENTS.

Section 603 of the National Science and Technology Policy, Organization, and Priorities Act of 1976 (42 U.S.C. 6683) is amended--

(1) in subsection (a), by inserting ``, but shall include the most economically important emerging civilian technologies during the 10-year period following such report, together with the estimated current and future size of domestic and international markets for products derived from these technologies'' after ``may not exceed 30'';

(2) in subsection (b), by striking ``national security and'' and inserting in lieu thereof ``national security or'';

(3) by redesignating subsection (d) as subsection (e); and

(4) by inserting after subsection (c) the following new subsection:

``(d) Each such report shall include--

``(1) an identification of the types of research and development needed to close any significant gaps or deficiencies in the technology base of the United States, as compared with the technology bases of major trading partners; and

``(2) a list of the technologies and markets targeted by major trading partners for development or capture.''.

SEC. 504. CRITICAL INDUSTRIES.

(a) IDENTIFICATION OF INDUSTRIES AND DEVELOPMENT OF PLAN.--The Secretary shall--

(1) identify those civilian industries in the United States that are necessary to support a robust manufacturing infrastructure and critical to the economic security of the United States;

(2) list the major research and development initiatives being undertaken, and the substantial investments being made, by the Federal Government, including its research laboratories, in each of the critical industries identified under paragraph (1); and

(3) develop a 10-year plan outlining the major public and private efforts, including research and development, needed to ensure the growth and stability of each critical industry identified under paragraph (1).

(b) INITIAL REPORT.--The Secretary shall submit a report to the Congress within 1 year after the date of enactment of this Act on the actions taken under subsection (a).

(c) ANNUAL UPDATES.--The Secretary shall annually submit to the Congress an update of the report submitted under subsection (b). Each such update shall--

(1) describe the status of each identified critical industry, including the advances and declines occurring since the most recent report;

(2) identify any industries that should be added to the list of critical industries; and

(3) recommend measures, including research and development, necessary to ensure the continued successful development of each identified critical industry.

SEC. 505. RESEARCH, DEVELOPMENT, TECHNOLOGY UTILIZATION, AND GOVERNMENT PROCUREMENT POLICY.

(a) ESTABLISHMENT OF COMMISSION.--The Secretary, in consultation with the Administrator of the Office of Federal Procurement Policy, shall establish a Commission on Technology and Procurement (hereafter in this section referred to as the ``Commission''), for the purposes of analyzing the effect of Federal Government procurement laws, procedures, and policies on the development of advanced technologies within the United States and making recommendations on how Federal policy could be changed to promote further the development of advanced technologies.

(b) ISSUES.--The Commission shall address the following issues:

(1) To what extent, if any, should Federal Government technology purchase strategies be used to give domestic suppliers a competitive advantage in new generations of existing technologies and in initial market penetration for new technologies?

(2) Under what conditions can Federal Government purchases of advanced technology-based products be based on performance specifications rather than on product specifications? Should Federal Government procurement first look to the commercial markets for products that will meet performance specifications before purchasing a unique product that has to be developed?

(3) How can the Federal Government procurement laws, practices, and procedures be used as a strategic tool to foster the use of emerging technologies?

(4) How can the Federal Government ensure that its suppliers adopt the principles embodied in the Malcolm Baldrige National Quality Award?

(5) Should Federal Government procurement practices include cooperative efforts between the supplier and the Federal entity to develop products so as to be more easily marketed on a commercial basis? Should a program for the exchange of technical personnel to foster

innovation in product development be part of such practices?

(6) To what extent, if any, should Federal Government documents specify standards that are beneficial to domestic suppliers, aid the compatibility of advanced technologies, and speed the commercial acceptance of those technologies, and what would be the role of the Institute in such an effort?

(7) To what extent should worldwide, state of the art technology be required in Federal Government procurement?

(c) MEMBERSHIP AND PROCEDURES.--(1) The Commission shall be composed of 15 members, 8 of whom shall constitute a quorum.

(2) The Secretary, the Administrator of the Office of Federal Procurement Policy, the Director of the Office of Science and Technology Policy, the Secretary of Defense, and the Administrator of General Services, or their designees who serve in executive level positions, shall serve as members of the Commission.

(3) The Secretary shall appoint as members of the Commission, from among individuals not employed by the Federal Government--

(A) 4 members who are eminent in advanced technology businesses representing manufacturing and services industries, including at least 1 member representing labor;

(B) 3 members who are eminent in the fields of technology and international economic development; and

(C) with the concurrence of the Administrator of the Office of Federal Procurement Policy, 3 members who are eminent in the field of Federal Government procurement.

(4) The Secretary shall appoint a Commission chairman from among the members of the Commission. The chairman shall call the first meeting of the Commission within 90 days after the date of enactment of this Act.

(5) The Secretary and the Administrator of the Office of Federal Procurement Policy shall provide such staff as may be required by the Commission to carry out its responsibilities.

(6) Members of the Commission, other than full-time employees of the Federal Government, while attending meetings of the Commission or otherwise performing duties of the Commission while away from their homes or regular places of business, shall be allowed travel expenses in accordance with subchapter I of chapter 57 of the title 5, United States Code.

(d) REPORTS.(1) The Commission shall, within 1 year after the date of enactment of this Act, submit to the Secretary, the Administrator of the Office of Federal Procurement Policy, the President, and Congress a report containing preliminary recommendations with respect to the issues addressed under subsection (b).

(2) The Commission shall, within 2 years after the date of enactment of this Act, submit to the Secretary and Congress a final report containing final recommendations with respect to the issues addressed under subsection (b).

(e) CONSULTATION.--The Commission shall consult, as appropriate, with the National Commission on Reducing Capital Costs for Emerging Technology.

(f) TERMINATION.--The Commission shall terminate 6 months after the submission of its final report under subsection (d)(2).

(g) AUTHORIZATION OF APPROPRIATIONS.--There are authorized to be appropriated to carry out this section such sums as may be necessary for the fiscal years 1991, and 1992, and 1993.

SEC. 506. REPORT ON INFORMATION COLLECTION AND DISSEMINATION.

(a) REPORT.--Within 270 days after the date of enactment of this Act, the Secretary shall report to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate on the feasibility of establishing and operating a Federal Online Information Product Catalog (FEDLINE) at the National Technical Information Service which would serve as a comprehensive inventory and authorizative register of information products and services disseminated by the Federal Government and assist agencies and the public in locating Federal Government information. Information protected from public disclosure shall not be included. In studying the concept, the Secretary, acting through the Under Secretary and the Director of the National Technical Information Service, shall consult with officials from appropriate Government agencies, including the Office of Management and Budget, the National Archives, the Government Printing Office, and the Institute, and with representatives of the public, for their views on the optimal composition and format of FEDLINE. Such report shall contain cost estimates and possible funding sources for establishing and operating FEDLINE and shall list any changes in law and regulation that would be required if FEDLINE were to be implemented.

(b) FUNDING.--The Director of the National Technical Information Service may retain and use all monies received, including receipts, revenues, and advanced payments and deposits, to fund obligations and expenses through the end of fiscal year 1992.

(c) ELECTRONIC FORMAT.--Section 212(e)(5) of the National Technical Information Act of 1988 (15 U.S.C. 3704b(e)(5)) is amended by inserting ``, including producing and disseminating information products in electronic format'' after ``engineering information''.

SEC. 507. NATIONAL QUALITY COUNCIL.

(a) ESTABLISHMENT AND FUNCTIONS.--There is established a National Quality Council (hereafter in this section referred to as the ``Council''). The functions of the Council shall be--

(1) to establish national goals and priorities for Quality performance in business, education, government, and all other sectors of the nation;

(2) to encourage and support the voluntary adoption of these goals and priorities by companies, unions, professional and business associations, coalition groups, and units of government; as well as private and nonprofit organizations;

(3) to arouse and maintain the interest of the people of the United States in Quality performance, and to encourage the adoption and institution of Quality performance methods by all corporations, government agencies, and other organizations; and

(4) to conduct an annual White House Conference on Quality Performance in the American Workplace that would bring together in a single forum national leaders in business, labor, education, professional societies, the media, government, and politics to address Quality performance as a means of improving United States competitiveness.

(b) MEMBERSHIP.--The Council shall consist of not less than 17 nor more than 20 members, appointed by the President of the United States by and with the advice and consent of the Senate. Members shall include--

(1) at least 2 but not more than 3 representatives from manufacturing industry;

(2) at least 2 but not more than 3 representatives from service industry;

(3) at least 2 but not more than 3 representatives from national Quality not-for-profit organizations;

(4) two representatives from education, one with expertise in elementary and secondary education, and one with expertise in post-secondary education;

(5) one representative from labor;

(6) one representative from professional societies;

(7) one representative each from local and State government;

(8) one representative from the Federal Quality Institute;

(9) one representative from the National Institute of Standards and Technology;

(10) one representative from the Department of Defense;

(11) one representative from a civilian Federal agency not otherwise represented on the Council, to be

rotated among such agencies every 2 years; and

(12) one representative from the Foundation for the Malcolm Baldrige National Quality Award.

(c) TERMS.--The term of office of each member of the Council appointed under paragraphs (1) through (7) of subsection (b) shall be 2 years, except that when making the initial appointments under such paragraphs, the President shall appoint not more than 50 percent of the members to 1 year terms. No member appointed under such paragraphs shall serve on the Council for more than 2 consecutive terms.

(d) CHAIRMAN AND VICE CHAIRMAN.--The President shall designate one of the members initially appointed to the Council as Chairman. Thereafter, the members of the Council shall annually elect one of their number as Chairman. The members of the Council shall also annually elect one of their members as Vice Chairman. No individual shall serve as Chairman or Vice Chairman for more than 2 consecutive years.

(e) EXECUTIVE DIRECTOR AND EMPLOYEES.--The Council shall appoint and fix the compensation of an Executive Director, who shall hire and fix the compensation of such additional employees as may be necessary to assist the Council in carrying out its functions. In hiring such additional employees, the Executive Director shall ensure that no individual hired has a conflict of interest with the responsibilities of the Council.

(f) FUNDING.--There is established in the Treasury of the United States a National Quality Performance Trust Fund, into which all funds received by the Council, through private donations or otherwise, shall be deposited. Amounts in such Trust Fund shall be available to the Council without further appropriation for the purpose of carrying out the functions of the Council under this Act.

(g) CONTRIBUTIONS.--The Council may not accept private donations from a single source in excess of $25,000 per year. Private donations from a single source in excess of $10,000 per year may be accepted by the Council only on approval of two-thirds of the Council.

(h) ANNUAL REPORT.--The Council shall annually submit to the President and the Congress a comprehensive and detailed report on--

(1) the progress in meeting the goals and priorities established by the Council;

(2) the Council's operations, activities, and financial condition;

(3) contributions to the Council from non-Federal sources;

(4) plans for the Council's operations and activities for the future; and

(5) any other information or recommendations the Council considers appropriate.

SEC. 508. FUNCTIONS OF FEDERAL COORDINATING COUNCIL FOR SCIENCE, ENGINEERING, AND TECHNOLOGY.

(a) INTERAGENCY RESEARCH PLANS.--Section 102(a)(6) of the National Science and Technology Policy, Organization, and Priorities Act of 1976 (42 U.S.C. 6602(a)(6)) is amended to read as follows:

``(6) The development and implementation of long-range, interagency research plans to support policy decisions regarding identified national and international concerns, and for which a sustained and coordinated commitment to improving scientific understanding or technology will be required.''.

(b) COUNCIL.--Section 401 of the National Science and Technology Policy, Organization, and Priorities Act of 1976 (42 U.S.C. 6651) is amended to read as follows:

``MEMBERSHIP AND FUNCTIONS OF COUNCIL

``SEC. 401. (a) The Federal Coordinating Council for Science, Engineering, and Technology (hereafter in this Act referred to as the `Council') shall be composed of the Director, who shall be Chairman of the Council, and 1 representative of each of the Federal departments and agencies which the President shall designate. Each such representative shall be an official of policy rank appointed by the head of the Federal department or agency designated.

``(b) The Council shall consider problems and developments in the fields of science, engineering, and technology and related activities affecting more than 1 Federal agency, and shall recommend policies and other measures designed to--

``(1) provide more effective planning and administration of Federal scientific, engineering, and technological programs;

``(2) identify research needs, including areas requiring additional emphasis;

``(3) achieve more effective utilization of the scientific, engineering, and technological resources and facilities of Federal agencies, including the elimination of unwarranted duplication; and

``(4) further international cooperation in science, engineering, and technology.

``(c) The Council may be assigned responsibility for developing long-range and coordinated plans for scientific and technical research which involve the participation of more than 2 Federal agencies. Such plans shall--

``(1) identify research approaches and priorities which most effectively advance scientific understanding and provide a basis for policy decisions;

``(2) provide for effective cooperation and coordination of research among Federal agencies; and

``(3) encourage domestic and, as appropriate, international cooperation among government, industry, and university scientists.

``(d) The Council shall perform such other related advisory duties as shall be assigned by the President or by the Chairman of the Council.

``(e) For the purpose of carrying out the provisions of this section, each Federal agency represented on the Council shall furnish necessary assistance to the Council. Such assistance may include--

``(1) detailing employees to the Council to perform such functions, consistent with the purposes of this section, as the Chairman of the Council may assign to them; and

``(2) undertaking, upon request of the Chairman, such special studies for the Council as come within the scope of authority of the Council.

``(f) For the purpose of developing interagency plans, conducting studies, and making reports as directed by the Chairman, standing committees and working groups of the Council may be established.''.

(c) CONFORMING AMENDMENT.--Section 207(a)(1)) of the National Science and Technology Policy, Organization, and Priorities Act of 1976 (42 U.S.C. 6616(a)(1)] is amended by striking ``established under title IV''.

SEC. 509. STUDY OF TESTING AND CERTIFICATION.

(a) CONTRACT WITH NATIONAL RESEARCH COUNCIL.--Within 90 days after the date of enactment of this Act and within available appropriations, the Secretary shall enter into a contract with the National Research Council for a thorough review of international product testing and certification issues. The National Research Council will be asked to address the following issues and make recommendations as appropriate:

(1) The impact on United States manufacturers, testing and certification laboratories, certification organizations, and other affected bodies of the European Community's plans for testing and certification of regulated and nonregulated products of non-European origin.

(2) Ways for United States manufacturers to gain acceptance of their products in the European Community and in other foreign countries and regions.

(3) The feasibility and consequences of having mutual recognition agreements between testing and certification organizations in the United States and those of major trading partners on the accreditation of testing and certification laboratories and on quality control requirements.

(4) Information coordination regarding product acceptance and conformity assessment mechanisms between

the United States and foreign governments.

(5) The appropriate Federal, State, and private roles in coordination and oversight of testing, certification, accreditation, and quality control to support national and international trade.

(b) MEMBERSHIP.--In selecting the members of the review panel, the National Research Council shall consult with and draw from, among others, laboratory accreditation organizations, Federal and State government agencies involved in testing and certification, professional societies, trade associations, small business, and labor organizations.

(c) REPORT.--A report based on the findings and recommendations of the review panel shall be submitted to the Secretary, the President, and Congress within 18 months after the Secretary signs the contract with the National Research Council.

SEC. 510. REPORT ON A STRATEGY TO STIMULATE COMPETITIVE RESEARCH.

(a) IN GENERAL.--No later than 120 days after the date of enactment of this Act, the Director of the Office of Science and Technology Policy shall submit to Congress a report presenting a proposed strategy for improving the university research capabilities of those States which historically have received relatively little Federal research and development funding. The report shall particularly discuss the feasibility and advisability of using the National Science Foundation's Experimental Program to Stimulate Competitive Research as a model for similar programs in other Federal departments and agencies which fund research and development.

(b) ANALYSIS AND DISCUSSION.--The report shall include an analysis and discussion of--

(1) the geographic distribution of Federal research and development grants and contracts;

(2) current Federal efforts to stimulate competitive research; and

(3) the feasibility and advisability of new Federal programs to stimulate competitive research.

SEC. 511. INTERAGENCY COORDINATION.

The Secretary shall, within 180 days after the date of enactment of this Act, submit to the Committee on Science, Space, and Technology and the Committee on Energy and Commerce of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate, a plan for coordination of Commerce Department efforts with other Federal agencies for activities related to high-resolution information systems, including research and development activities.

TITLE VI--LEAD EXPOSURE HAZARDS

SEC. 601. FINDINGS.

The Congress finds that--

(1) lead is a naturally occurring element which has been used in a variety of industrial applications including radiation shields, storage batteries, paint, and gasoline;

(2) 1 in 6 United States children are victims of lead poisoning, according to the Agency for Toxic Substances and Disease Registry;

(3) lead poses a significant environmental health problem since adverse effects have been conclusively demonstrated at relatively low exposures;

(4) lead exposures to children under age 7 are of greatest concern because of its association with significant neurotoxic effects, including reduction in intelligence, attention span deficits, and reading and learning disabilities;

(5) a primary cause of childhood lead poisoning is lead-based paint and dust in homes;

(6) past efforts to abate lead-based paint have relied on methods which endangered workers and often resulted in more available lead dust for the occupants; and

(7) improving methods for testing and abating lead-based paint offers a highly cost effective means of reducing exposures and thus preventing childhood lead poisoning.

SEC. 602. LABORATORY ANALYSIS STANDARDIZATION.

The National Institute of Standards and Technology shall, within 18 months after the date of enactment of this Act, recommend to the Administrator of the Environmental Protection Agency technical criteria and implement a voluntary accreditation program with respect to laboratory analysis of lead in paint films, soil, and dust. Funds required for implementing such a voluntary accreditation program shall be provided to the National Institute of Standards and Technology by the Administrator of the Environmental Protection Agency. Funds received through fees and other charges for accreditation services under such program may be used by the National Institute of Standards and Technology for operating costs of the program.

SEC. 603. DETECTION TECHNOLOGY STANDARDIZATION.

Subject to the availability of funds, the National Institute of Standards and Technology shall, within 2 years after the date of enactment of this Act, recommend to the Administrator of the Environmental Protection Agency protocols, criteria, reference materials, and minimum performance standards to be used in the evaluation of emerging products and techniques for detecting lead in paint films and dust, including x-ray fluorescence devices, on-site chemical spot testers, and laboratory methods, and to ensure reliable, accurate, and effective lead detection technologies.

SEC. 604. STANDARDIZATION OF ABATEMENT PRODUCTS.

Subject to the availability of funds, the National Institute of Standards and Technology shall recommend to the Administrator of the Environmental Protection Agency performance criteria and standards for lead paint encapsulants and for strippers within 2 years after the date of enactment of this Act.

The **Chairman**. I would now like to recognize our distinguished ranking member for any opening statement he may have.

Mr. **Walker**. Thank you, Mr. Chairman. As an original author and current sponsor, I am glad to join you in supporting the emerging technology commercialization legislation being recommended to us by Chairman Valentine and Republican Leader Lewis and the entire Competitiveness Subcommittee.

This bill is virtually identical to a bipartisan agreement reached at the end of the 101st Congress. Consistent with that House-Senate agreement, this bill sets the authorization for the Advanced Technology Program at $100 million annually with grant payback required. This will responsibly expand the newly initiated effort to reduce the marginal costs of capital for developing new technologies by leveraging the majority funding of even more competitively selected, industry-led joint ventures.

A blue-ribbon National Capital Cost Commission, chaired by the Vice President with three members appointed by the President, the House, and the Senate, is established to make legislative and tax recommendations to Congress within one year. The National Institute of Standards and Technology's Core Research Program is authorized to fully support the President's competitiveness initiatives in such areas as superconductivity, advanced materials, chemical quality control, and fiber-optics.

Today, this committee has a real opportunity to reestablish its relevance. With this bill, we can reassert our preeminent role in Congress for setting the program priorities for technology R&D. To do this, we must move it through both houses quickly in advance of the appropriations process. The only way to accomplish this is with consensus based upon our agreement and with the Administration's support.

The bill before us, with some technical amendments to be offered provides that consensus. We should all protect and defend it. However, any effort to further expand programs or to change policy would only break the unified front we have finally achieved. This will delay action and harm our effort to influence funding. We would be snatching defeat from the jaws of victory, and I hope we won't do that.

Thank you, Mr. Chairman.

The **Chairman**. Thank you very much, Mr. Walker.

I will be glad to recognize other members for brief opening statements, including Mr. Valentine, if he so desires.

Mr. **Valentine**. Mr. Chairman, I have an opening statement, which I will undertake to condense and ask unanimous consent that it be placed in the record in toto so as to facilitate the proceedings.

The **Chairman**. Without objection, so ordered.

Mr. **Valentine**. I am pleased, Mr. Chairman and members of the committee, to bring before the members of the full committee H.R. 1989, the American Technology Preeminence Act of 1991, and I wish to second the chairman's comments regarding the hard work of the subcommittee. Although it is still early in the Congress, I believe that we are bringing forward a major competitiveness initiative, one that is a composite of many ideas and many different proposals as to how to address the problem. I think that the legislation is well understood by most members of the subcommittee, if not everybody here.

I do want to say that what we will vote on today would not have been possible without the hard work and diligence of the ranking member of our subcommittee, Mr. Tom Lewis, and without the dedication of all of the members of the subcommittee. We made a real effort, Mr. Chairman, to iron out any individual "partisan" differences that existed and bring to you here today legislation that we think will help to move our country forward and return us to the position of preeminence that we previously occupied. I urge my colleagues to support the legislation.

[The prepared statement of Mr. Valentine follows:]

OPENING REMARKS

OF

HONORABLE TIM VALENTINE

FULL COMMITTEE MARKUP OF THE

AMERICAN TECHNOLOGY PREEMINENCE ACT OF 1991

H.R. 1989

I am pleased to bring before the Members of the Science, Space, and Technology Committee, H.R. 1989, the American Technology Preeminence Act of 1991 and wish to second Mr. Brown's comments regarding the hard work of the Subcommittee. Although it is still early in the Congress, I believe we are bringing forward a major competitiveness initiative.

H.R. 1989 authorizes appropriations for the Department of Commerce Technology Administration programs for fiscal years 1991 and 1992 at levels permitting prudent increases both in internal and grant programs. The Technology Administration is made up of the Office of the Under Secretary for Technology, the National Institute of Standards and Technology, and the National Technical Information Service.

Title I authorizes each of the programs of the Technology Administration, totaling $289,728,000 for fiscal year 1991 and $347,500,000 for fiscal year 1992, which is consistent with last year's agreement.

For NIST's intramural programs, funding for FY 1991 is authorized at the appropriated level of $166,228,000 million, and $211,000,000 million, for FY 1992, which is $10 million over the Administration's request, and reflects the Committee's concern that NIST's core research programs be adequately supported.

The bill also provides for reasonable growth in NIST's Extramural

Programs, which are so important for our competitiveness effort. The Advanced Technology Program is authorized at $100 million for both years. This program is scaled back from last year's bill, recognizing that appropriations levels have been well below earlier authorizations. Other effective outreach programs such as the State Technology Extension Program and the Non-Energy Related Inventions Program are level-funded, and funding for the Regional Manufacturing Centers is increased to permit the establishment of two additional centers. Total funding for the Extramural Programs for FY 1991 is $117,000,000 million and $127,000,000 million for FY 1992. Each of these programs has the potential for significant economic impact and deserve to be supported.

The bill also authorizes $6,000,000 million for the Office of the Under Secretary for Technology for FY 1991 and $7,500,000 million for FY 1992, which includes a modest increase in funding for the Japanese Technical Literature Program. Half a million dollars is authorized for FY 1991 and $1,500,000 million for FY 1992 for the modernization efforts at the National Technical Information Service.

Title II provides further direction and authority for the Advanced Technology Program, which is designed to foster development of emerging technologies and help American companies meet the challenge of foreign technology initiatives.

Title III addresses this country's technology transfer effort by making funding for the Federal Laboratory Consortium permanent; clarifies that the Government may contribute intellectual property as part of its contribution under a cooperative research and development agreement (CRADA) in technology transfer efforts; and amends present law to extend the royalty sharing program for Federal agencies to legislative branch inventors. This title also authorizes appropriated funds for NIST to carry out its responsibililties under the Malcolm Baldrige National Quality Improvement Act of 1987, which has proven to be an effective way to improve quality in this country's goods and services.

Title IV establishes a National Commission on Reducing Capital Costs for Emerging Technologies to develop recommendations to lower the cost of capital in the United States and increase the competitiveness of U.S. industry by encouraging investment in quality products and process improvements.

Title V establishes a High Resolution Information Systems Board to increase the cooperation between Government and industry in the development of high resolution information systems; strengthens the biennial OSTP report, identifying critical civilian technologies that will be essential to the U.S. economy; establishes a Commission on Technology and Procurement to make recommendations on changing the government procurement system to encourage use of emerging technologies, establishes a National Quality Council to set national goals; requires the Department of Commerce to create a Federal on-line information product catalog to register all government information products and to assist agencies and the public in securing Federal Government informations. This title also requires reports on competitive research and international standards, and clarifies the role of the Federal Coordinating Council for Science, Engineering and Technology.

Title VI requires NIST to implement an accreditation program to be used in the evaluation and detection of lead in paint, films, soil and dust.

Mr. Chairman, that concludes the Subcommittee report on the American Technology Preeminence Act. This bill is important both for its strengthening of important Department of Commerce programs and for its various commissions and studies which will help develop the information and policies that will lead to further competitiveness legislation. I urge my colleagues to approve this bill.

The CHAIRMAN. Thank you very much.

Mr. Lewis, would you care to make an opening statement?

Mr. LEWIS. Thank you, Mr. Chairman. I will just make a couple of comments and ask unanimous consent that my statement be included in the record.

Mr. Chairman, I would like to point out the cooperation of the subcommittee as Chairman Valentine has done. In the subcommittee, this legislation did have bipartisan support and then was unanimous. The subcommittee included amendments to this legislation from our side for Mr. Ritter, Mr. Boehlert, and Mr. Walker, and report language for Mr. Campbell and Mrs. Morella. The legislation also reflects the funding levels of the Brown-Walker March 15th submission to the Budget Committee.

With that, Mr. Chairman, I would like to thank the committee for its cooperation and also for the leadership by Chairman Valentine in moving this legislation forward.

[The prepared statement of Mr. Lewis follows:]

OPENING STATEMENT
HON. TOM LEWIS (R-FL)
AMERICAN TECHNOLOGY PREEMINENCE ACT
MAY 2, 1991

Thank you Mr. Chairman.

The American Technology Preeminence Act, H.R. 1989, is a significant piece of legislation that will lead to advances in United State competitiveness. Most of the sections are similar to those that passed the Committee last Congress.

The support for this legislation in the Subcommittee was both bipartisan and unanimous. In addition, the Subcommittee included amendments to the legislation from our side for Mr. Ritter, Mr. Boehlert, and Mr. Walker; and report language for Mr. Campbell and Mrs. Morella.

The legislation also reflects the funding levels of the Brown-Walker March 15, 1991 submission to the Budget Committee.

The programs contained in this legislation are important to the establishment of strong technology standards and to give U.S. industry assistance as we move toward improving our competitiveness worldwide.

Finally, I want to congratulate Subcommittee Chairman Valentine for his leadership and willingness to forge a bipartisan bill. I also want to thank Chairman Brown and Ranking Member Walker for their support and interest in moving this legislation so quickly.

I urge my colleagues to support the American Technology Preeminence Act, H.R. 1989.

Thank you Mr. Chairman.

Mr. **Mineta**. Mr. Chairman?

The **Chairman**. Mr. Mineta.

Mr. **Mineta**. Mr. Chairman, I ask unanimous consent to revise and extend my remarks.

The **Chairman**. Without objection.

Mr. **Mineta**. I would just like to congratulate you on holding this markup of the Department of Commerce Authorization Bill and congratulate my colleagues, Mr. Valentine and Mr. Lewis, for their very hard work on moving this bill so quickly and smoothly through the Technology and Competitiveness Subcommittee.

I strongly support this effort to pass this American Technology Preeminence Act that the House passed overwhelmingly last year. I will be offering an amendment later on the process and do hope that I will be able to get support for that amendment.

The **Chairman**. Thank you very much, Mr. Mineta.

Do any other members desire to offer comment? If not, the procedure will be to recognize Mr. Valentine to submit the subcommittee report, then Mr. Lewis for any additional comments on the subcommittee report, and then after any discussion, the Chair will entertain a motion to adopt the report, which will make the bill open for discussion and amendment at any point at that time.

Mr. Valentine, you may proceed in whatever length you wish to submit your report.

Mr. **Valentine**. Mr. Chairman, I think what I have said is sufficient unless the Chair would desire that I go into it further. I believe that I would prefer to leave it at that unless the chairman has a different idea.

The **Chairman**. No, we'll try to expedite it.

Do you have anything further, Mr. Lewis? Are you ready to proceed?

Mr. **Lewis**. I will make a motion, Mr. Chairman.

The **Chairman**. The Chair recognizes Mr. Lewis for a motion.

Mr. **Lewis**. Thank you, Mr. Chairman. I move the adoption of the recommendation of the Subcommittee on Technology and Competitiveness on H.R. 1989, the American Technology Preeminence Act of 1991.

The **Chairman**. Is there a second?

Mr. **Valentine**. I second the motion.

The **Chairman**. Motion has been made and seconded.

Any discussion? If not, the Chair will put the question.

All those in favor of the committee report will say aye.

[Chorus of ayes.]

The **Chairman**. Opposed, no.

[No response.]

The **Chairman**. The committee report is now before us. I ask unanimous consent to use the subcommittee print as the original text for the purpose of markup and to consider the print as having been read and open for discussion and amendment at any point.

Is there any discussion? Any amendments?

The Chair has a list of amendments in order, and we will recognize the sponsors in this order, starting with Mr. Thornton.

Mr. **Thornton**. Thank you, Mr. Chairman.

First, let me add my comments about the importance of this legislation to our competitive stance. How vital it is that we develop new ways of meeting the challenges that face our country and how important it is that we provide a flexibility and an opportunity for creative development of relationships between the private sector, academia, and government.

As I looked at the bill, it occurred to me that we had let something slip since the time that I was here before. In 1980 at the beginning of the 96th Congress, we appropriated for the Office of Productivity, Technology and Innovation, in order to study and stimulate the kind of exchange of ideas and inventive genius into the marketplace, a sum of $7,200,000.

That money was well spent and developed programs that have matured and have received a great deal more funding than the original line item. However, over the period of time which has ensued, we have cut back on the money available for planning, creativity, and cut back rather significantly, so that even with the additional million dollars for the second year of this biennium that my amendment proposes, the total amount available for this function will be only $6 million. That is a real decrease of about one-third in purchasing power available for this most important function of the under secretary and the assistant secretary.

The amendment which I propose is to correct that slip that has occurred over this period of time and to use, not additional money from outside the budget, but to transfer from an increase that we have already provided to the Administration request, that $1 million. In another area, we have increased from the Administration request of $201 million for the NIST programs to $211 million.

My amendment would remove $1 million from that so that the net increase to NIST, which I greatly approve and support, of $9 million in the authorization legislation would be sufficient to give them the impetus that they so greatly need and at the same time, would provide this office, which can and should become a centrally important office in developing the idea of a comprehensive solution to America's technology enterprise by adding a reasonable amount to their budget for the second year.

Mr. Chairman, I ask for consideration of this amendment and for support of its adoption.

[The amendments offered by Mr. Thornton follow:]

(a)

THORNT001

AMENDMENTS TO THE COMMITTEE PRINT
OFFERED BY MR. THORNTON

Page 3, line 13, strike ``$9,000,000'' and insert in lieu thereof ``$10,000,000''.

Page 3, line 15, strike ``$1,600,000'' and insert in lieu thereof ``$2,000,000''.

Page 3, line 16, strike ``$3,400,000'' and insert in lieu thereof ``$4,000,000''.

Page 6, line 20, strike ``$211,000,000'' and insert in lieu thereof ``$210,000,000''.

Page 6, line 23, strike ``$34,000,000'' and insert in lieu thereof ``$33,700,000''.

Page 7, line 8, strike ``$38,700,000'' and insert in lieu thereof ``$38,000,000''.

The **Chairman**. The Chair thanks the gentleman.

Is there any additional debate? Mr. Walker?

Mr. **Walker**. Mr. Chairman, I am opposed to this amendment. Let's understand what this amendment does.

This amendment, first of all, raises the authorization in the bill for the Technology Administration from $7.5 million to $8.5 million. The gentleman has fairly presented that as only a $1 million increase.

Well, the $7.5 million that is the bill is already a 50 percent increase over the President's request of $4.9 million. Now I am not certain who is asking for this additional million dollars. We have already gone up 50 percent over what the President requested.

I don't know if there is somebody down at the Department of Commerce who is empire-building down there or just what is going on, but I really do have real questions about why we need additional bureaucrats at the Commerce Department at a time when we are attempting to come up with the money that we need for R&D. That is the second point that members need to understand about this particular amendment.

This million dollars is not a no-cost amendment. This million dollars comes out of the hide of NIST and it comes out of the hide of hard lab research that has the potential to really pay some dividends in terms of industrial competitiveness, and it transfers the money out of hard lab research into central planning—in other words, over to the white-collar paper-pushers.

If you think that this committee should be in the job of expanding bureaucracy and doing the bureaucrats favors, then it seems to me, you will want to support this amendment. If you think that what this committee should be all about is R&D and making certain that we have the kind of lab research that backs up our competitiveness, and that there is no place where we need some additional funding more than NIST in order to do that, then it seems to me, you will have to reject this amendment.

I come down on the latter side. I think it is very important that we have that extra million dollars over at the Department of Commerce's NIST program; that we do have the resources necessary in order to do the technological development work and the lab work necessary for a rapidly changing technological world.

I recognize that this committee has gone above and beyond what the Administration requested for NIST. I am perfectly willing to take the heat for that, and I'm willing to go to the Administration and say: I don't think you did well enough there and we ought to have additional monies for the NIST program. But I am not willing to have those programs expanded only to then have the money peeled off from them in order to come up with more bureaucrats at one of the agencies of the Department of Commerce.

Mr. **Thornton**. Would the gentleman yield?

Mr. **Walker**. I would hope that this amendment would be rejected and that we would stick with our priority toward more research and development work rather than more bureaucrats.

I'd be happy to yield to the gentleman.

Mr. **Thornton**. I thank the gentleman.

We are of different views on what is called for by this amendment. I agree that we need to spend more money in research and development and that we need to have ad hoc solutions on an item by item basis, but I think that what is really missing from the Congress and from the Administration is the planning, the strategic planning, to utilize our resources in the best way to meet the emerging needs for competitiveness. Spending more money without adequate planning and vision is not going to achieve the results that we need to have.

Mr. WALKER. Reclaiming my time, let me say to the gentleman that that is the reason, I guess, why the subcommittee decided that we were going to raise the funding by 50 percent. I happen to think that a 50 percent increase in that account is probably as much as we can do responsibly. To go another million dollars just does not, in this gentleman's opinion, make any sense, particularly when that comes out of the hide of the other thing that we have to do, and that is good R&D.

Mr. THORNTON. I thank the gentleman for yielding.

The CHAIRMAN. Is there additional debate on the amendment offered by the gentleman from Arkansas?

Mrs. MORELLA. Mr. Chairman?

The CHAIRMAN. Mrs. Morella is recognized.

Mrs. MORELLA. Thank you, Mr. Chairman. I want to point out that I did speak to Mr. Thornton and I understand exactly what he is getting at. It is not only admirable, but I would agree with it.

However, I also agree with what I heard Mr. Walker say. We have to be very careful about the fact that we do not do anything to diminish in any way the major mission of NIST in terms of its intramural programs. So I oppose that.

Maybe there is another way that the funding can be found to do what he wants to do in terms of the creativity, which we need for competitiveness. But I will vote against taking it from the intramural programs.

Mr. VALENTINE. Mr. Chairman?

The CHAIRMAN. The gentleman from North Carolina is recognized.

Mr. VALENTINE. Let me say, as chairman of the subcommittee which considered the legislation, which is here today making report to the full committee, that our colleague, Mr. Thornton, is a valuable member of the subcommittee. He came to us and suggested the amendment after the subcommittee had acted. I accept his argument that this change adds to the legislation, makes it better, makes a contribution, and as chairman of the subcommittee, I would like to urge the members of the committee to support the amendment presented by the gentleman from Arkansas.

The CHAIRMAN. Mr. Rohrabacher?

Mr. ROHRABACHER. Mr. Chairman, I just believe that we have too many people working for Government who are just strategizing about things and spending their time getting paid high salaries in order to sit at their desks and come up with grandiose strategies. I think it is much more valuable to have this money spent on research and hard lab work rather than, as Congressman Walker suggested, spending it on pushing papers. I will oppose this amendment.

The CHAIRMAN. Mr. Roemer?

Mr. ROEMER. Mr. Chairman, I will be supporting my esteemed colleague from Arkansas. We sat through a three hour hearing yesterday and heard testimony from Dick Nanto at CRS who agreed with the entire panel and said that the United States is very good at the research part of research and development, but that we do need assistance in developing some of our R&D money.

I would agree with Mr. Walker in that we do need more of our resources to go into research, but we also need to know what to do with that research, whether it is a VCR or a magnetic levitation train, to plan to help commercialize that product. I think that this is a good idea if we can have that money go to that aspect.

Mr. WALKER. Would the gentleman yield?

Mr. ROEMER. Yes, sir.

Mr. WALKER. You make a good point. The one thing though that I think has been clear from most of the research that I have seen done—and I don't know what the gentleman from CRS had to say—is that the worst people at making those kinds of decisions are government bureaucrats, because they have no feel whatsoever for what an entrepreneur will do to utilize research. What you need is a blend of entrepreneurial people into the system that assures that they have the research base that they can then use to make products for the commercial marketplace.

The worst system that you can possibly have is to have government bureaucrats trying to decide that. First of all, they have no understanding of the research involved. Secondly, they have no understanding of what entrepreneurial concepts and marketability is all about.

To add this layer of bureaucracy between the research and the entrepreneurs is probably destructive rather than helpful to what we are trying to do. Therefore, from the standpoint of what the gentleman says, I don't even understand this amendment because this is outside the scope of what most people are telling us that we have to do as a nation if we are going to have more marketability of the good research that we do.

Mr. ROEMER. From the testimony yesterday—and I hope that the gentleman from Arkansas' amendment is not adding a layer of bureaucracy; I don't think it is. I don't think that we agree with what that would accomplish. We have concerns about those kinds of mandates, and I don't think we want to see that happen.

Mr. WALKER. Would the gentleman yield?

Mr. ROEMER. We would like to see this go toward entrepreneurship, toward creativity, and toward strategic planning, not toward bureaucratic salaries and not toward more creation of layers of bureaucracy.

Mr. WALKER. If the gentleman would yield—what is this money going for? This money is going to an office for strategic planning. That is going to end up buying government employees.

What is this money going to do? How is any of this money going to get into the hands of entrepreneurs?

Mr. BACCHUS. Will the gentleman yield?

Mr. ROEMER. I will yield my time to the gentleman from Florida.

Mr. BACCHUS. Speaking solely for myself, I have every confidence that the Bush Administration will be able to bring people who embody the entrepreneurial spirit of America into the Department of Commerce.

[Laughter.]

Mr. **Walker**. If the gentleman would yield to me—

Mr. **Roemer**. Do you want me to yield, Mr. Bacchus? I thought that was a good comment.

Mr. **Walker**. Well, that is a nice statement.

[Laughter.]

Mr. **Walker**. I would simply say that once people are brought into government, they tend to become more bureaucrats than entrepreneurs. They tend to play departmental politics rather then doing entrepreneurial kinds of work.

The point is that all we are doing with this money is expanding the ability of the government to expand its bureaucracy. It doesn't matter who is in place. That is at the expense of research and it is not a good idea.

The **Chairman**. Is there any further debate on the amendment offered by the gentleman from Arkansas? If not, the Chair is prepared to put the question.

All those in favor of the amendment, will signify by saying aye.

[Chorus of ayes.]

The **Chairman**. Opposed, no.

[Chorus of noes.]

The **Chairman**. The Chair is in doubt. We will have a show of hands.

All those in favor of the amendment, will please raise their hands and leave them up until counted.

[Show of hands.]

The **Chairman**. All those opposed?

[Show of hands.]

The **Chairman**. Clerk will report.

The **Clerk**. I have the count as eight ayes and eight noes.

Mr. **Thornton**. Roll call, Mr. Chairman.

The **Chairman**. The gentleman from Arkansas requests a roll call.

The **Chairman**. The clerk will call the roll.

The **Clerk**. Mr. Brown?

The **Chairman**. Aye.

The **Clerk**. Mr. Walker?

Mr. **Walker**. No.

The **Clerk**. Mr. Scheuer?

Mr. **Valentine**. Mr. Scheuer votes aye, by proxy.

The **Clerk**. Mr. Sensenbrenner?

[No response.]

The **Clerk**. Mrs. Lloyd?

Mr. **Valentine**. Mrs. Lloyd votes aye, by proxy.

The **Clerk**. Mr. Boehlert?

Mr. **Boehlert**. No.

The **Clerk**. Mr. Glickman?

Mr. **Valentine**. Mr. Glickman, aye, by proxy.

The **Clerk**. Mr. Lewis?

[No response.]

The **Clerk**. Mr. Volkmer?

Mr. **Valentine**. Aye, by proxy.

The **Clerk**. Mr. Ritter?

[No response.]

The **Clerk**. Mr. Wolpe?

Mr. **Valentine**. Aye, by proxy.

The **Clerk**. Mr. Morrison?

[No response.]

The **Clerk**. Mr. Hall?

Mr. **Valentine**. Aye, by proxy.

The **Clerk**. Mr. Packard?

Mr. **Packard**. No.

The **Clerk**. Mr. McCurdy?

Mr. **Valentine**. Aye, by proxy.

The **Clerk**. Mr. Henry?

Mr. **Henry**. No.

The **Clerk**. Mr. Mineta?

Mr. **Mineta**. Aye.

The **Clerk**. Mr. Fawell?

Mr. **Fawell**. No.

The **Clerk**. Mr. Valentine?

Mr. **Valentine**. Aye.

The **Clerk**. Mr. Slaughter

Mr. **Slaughter**. No.

The **Clerk**. Mr. Torricelli?

Mr. **Valentine**. Aye, by proxy.

The **Clerk**. Mr. Smith?

Mr. **Smith**. No.

The **Clerk**. Mr. Boucher?

Mr. **Valentine**. Aye, by proxy.

The **Clerk**. Mrs. Morella?

Mrs. **Morella**. No.

The **Clerk**. Mr. Bruce?

Mr. **Valentine**. Aye, by proxy.

The **Clerk**. Mr. Rohrabacher?

Mr. **Rohrabacher**. No.

The **Clerk**. Mr. Stallings?

Mr. **Valentine**. Aye, by proxy.

The **Clerk**. Mr. Schiff?

Mr. **Schiff**. No.

The **Clerk**. Mr. Traficant?

Mr. **Valentine**. Aye, by proxy.

The **Clerk**. Mr. Campbell?

Mr. **Campbell**. No.

The **Clerk**. Mr. Nowak?

Mr. **Valentine**. Mr. Nowak votes aye, by proxy.

The **Clerk**. Mr. Rhodes?

Mr. **Rhodes**. No.

The **Clerk**. Mr. Perkins?

Mr. **Valentine**. Aye, by proxy.

The **Clerk**. Mr. Barton?

Mr. **Barton**. No.

The **Clerk**. Mr. McMillen?

Mr. **Valentine**. Aye, by proxy.

The **Clerk**. Mr. Zimmer?

Mr. **Zimmer**. No.

The **Clerk**. Mr. Nagle?

Mr. **Valentine**. Aye, by proxy.

The **Clerk**. Mr. Gilchrest?

Mr. **Gilchrest**. No.

The **Clerk**. Mr. Hayes?

Mr. **Hayes**. Aye.

The **Clerk**. Mr. Costello?

Mr. **Costello**. Aye.

The **Clerk**. Mr. Tanner?

Mr. **Valentine**. Aye, by proxy.

The **Clerk**. Mr. Browder?

Mr. **Valentine**. Aye, by proxy.

The **Clerk**. Mr. Geren?

Mr. **Geren**. Aye.

The **Clerk**. Mr. Thornton?

Mr. **Thornton**. Aye.

The **Clerk**. Mr. Bacchus?

Mr. **Bacchus**. Aye.

The **Clerk**. Mr. Roemer?

Mr. **Roemer**. Aye.

The **Clerk**. Mr. Cramer?

Mr. **Valentine**. Aye, by proxy.

The **Clerk**. Mr. Swett?

Mr. **Swett**. No.

The **Clerk**. Mr. Kopetski?

Mr. **Valentine**. Aye, by proxy.

The **Clerk**. Ms. Horn?

Ms. **Horn**. Aye.

The **Clerk**. Mrs. Collins?

Mr. **Valentine**. Aye, by proxy.

The **Chairman**. Do any other members desire to be recorded? If not, the clerk will report the vote.

The **Clerk**. Mr. Chairman, I have 31 ayes and 10 noes.

Mr. **Ritter**. Mr. Chairman, how am I recorded?

The **Clerk**. Mr. Ritter is not recorded.

The **Chairman**. Without objection, Mr. Ritter is recognized to vote.

Mr. **Ritter**. Mr. Chairman, I vote no.

The **Chairman**. The clerk will report the corrected total.

The **Clerk**. The corrected total is 31 ayes and 11 noes.

The **Chairman**. There being 31 ayes and 11 noes, the amendment is agreed to.

Mr. **Walker**. Mr. Chairman?

The **Chairman**. Mr. Walker.

Mr. **Walker**. I would like it further noted as a part of that vote that the minority cast no proxy votes as a part of that vote, so that if it used in the future, it is understood that that was done with majority proxies cast and no minority proxies cast. And I would like to make an explanation.

Mr. Chairman, at the beginning of this session of the Congress, the minority offered a proposal not to use proxy votes in the committee. At that time, we were defeated on that, but we were given an assurance that proxy votes would only be used in those instances where it was of the gravest concern about the votes; where the matter was of such enormity that it could, in fact, cause a dislocation with the majority's own caucus if the proxy votes were not cast.

I understand that there are those times when proxy votes are absolutely necessary, but this is now the second time in as many markups where, on a matter of some significance but not of major magnitude, the majority has decided to reverse the will of the people present by using the proxy votes. I would hope that this is not going to be a pattern and the assurances that we received on opening day would in fact begin to govern how this committee works.

I think the fact that we have so few members here to participate in the work today is in part because members know that their votes are going to be cast by proxy rather than cast by their being present. I am disappointed that once again the will of the people who were present and voting has been overturned by proxy votes. I would hope that we are not going to see a pattern of this.

As for this member, I am not going to cast proxies in the course of the day today. I think that there are a couple of major issues that are before us, but I would hope that those issues will be decided by those people who hear the debate.

Thank you, Mr. Chairman.

The **Chairman**. I thank the gentleman from Pennsylvania. Of course, he knows that, in principle, I have a very large agreement with him on this matter. I regret myself that it is necessary in the course of events to use proxies.

Proceeding with the amendments, we next come to an amendment offered by the gentleman from California, Mr. Mineta. May I say that this is the most significant amendment that will be offered and the most controversial. I urge members to give it their very close attention and to vote their conscience on this matter.

Mr. Mineta?

Mr. **Mineta**. Mr. Chairman, after listening to the discussion on the previous amendment, I am offering the Mineta Entrepreneurial Amendment, listed on the amendment roster as amendment number B. I assume that all the members have before them copies of the amendment.

As established by the Congress under the leadership of this committee, Mr. Chairman, the National Institute of Standards and Technology was given the specific mission to "facilitate the more rapid commercialization" of advanced technologies. So my amendment is intended to strengthen and enhance the National Institute of Standards and Technology's ability to carry out that important mission by authorizing NIST to establish a technology commercialization loan program.

Currently, NIST is authorized to provide various types of technical and financial assistance to U.S. companies, including research grants, through the Advanced Technology Program. At the present time, NIST does not have a program designed to promote the actual commercialization of advanced technology research results.

We have had a lot of discussion about the difference between research and development and commercialization. That is what this amendment does. It makes the distinction between grants for research and development and loans for commercialization.

This is a crucial issue since U.S. companies often face tremendous barriers in trying to commercialize the results of the research and development efforts. Too often, we have watched the fruits of U.S. R&D efforts languish unused, only to be translated into products overseas.

Accordingly, Mr. Chairman, I believe that authorizing NIST to offer technology commercialization loans to U.S. companies would be an important and needed addition to NIST's capabilities. It would help U.S. companies move ideas from the laboratory to the marketplace. It would be an innovative way to address the problem of a lack of patient, low-cost capital available to U.S. high technology companies.

It would help the small and medium sized companies that are the chief source of high tech innovation in the United States. It would be an effective way to maximize the use of scarce government resources, giving taxpayers more bang for their buck. It also would help prevent the loss of U.S. technologies to foreign competitors, and it would give NIST and the Commerce Department greater flexibility in working with U.S. industry to improve high technology competitiveness.

Specifically, this amendment would authorize NIST to provide long-term, low-cost loans to small and medium sized U.S. companies for the purpose of developing and commercializing advanced technologies in areas such as electronics, advanced materials, or biotechnology.

This is a pay as you go amendment. The amendment earmarks $10 million from the bill's $100 million fiscal year 1992 ATP authorization to this loan program. NIST would be authorized to provide only that amount of loans which could be supported by the subsidy relative to OMB estimates of expected loan default rates.

This loan program is fully consistent with the credit reforms which Congress enacted this last year, and is similar to programs in other agencies that are intended to foster technology commercialization. As I said earlier, Mr. Chairman, I feel strongly that this technology commercialization loan program would be an innovative and effective way to strengthen NIST's ability to carry out its mission of working with U.S. high technology industries and would allow us to gain the maximum impact from limited government resources.

Just this last Friday, I had a symposium in my district dealing with Silicon Valley and where do we go in the future. We had people like Dr. Andrew Grove, the head of Intel, and John McMahon, the President of Lockheed Missile and Space Company speaking about their perspectives on Silicon Valley. We had the pleasure of having Congressman Don Ritter, Congressman Edwards, as well as Congressman Matsui, talking about a Federal perspective.

We had the superintendent of public schools for the State of California and the Secretary of Business Transportation and Housing for the State of California. Secretary Kovits was talking about where are we going in the future as it relates to high tech. I think Dr. Grove was probably the person who gave us the most telling reason why this kind of program is needed in terms of where technology is going and what its place is going to be in the future.

I strongly urge the adoption of this amendment, and yield back the balance of my time, Mr. Chairman.

[The amendments offered by Mr. Mineta follow:]

MINETA011

(b)

AMENDMENTS TO THE COMMITTEE PRINT
OFFERED BY MR. MINETA

Page 12, line 21, insert ``and to carry out section 106 of this Act,'' after ``and 278n),''.

Page 13, line 1, strike ``$100,000,000'' and insert in lieu thereof ``$90,000,000''.

Page 13, after line 1, insert the following new paragraph:

(4) Subsidy for technology commercialization loans under section 106 of this Act, $10,000,000.

Page 13, after line 13, insert the following new section:

SEC. 106. TECHNOLOGY COMMERCIALIZATION LOANS.

The Secretary, acting through the Director of the Institute, may make loans, to the extent provided in section 504 (b) of the Congressional Budget Act of 1974, to small and medium size businesses eligible for assistance under section 28 of the National Institute of Standards and Technology Act (15 U.S.C. 278n). Loans under this section may be made to support research and development on, and the demonstration of the commercial feasibility of, advanced technologies and products in fields such as automation, electronics, advanced materials, biotechnology, and optical technologies. Loans under this section shall be made at an interest rate equal to the Government borrowing rate plus an insurance surcharge of up to 2 percent.

Redesignate subsequent sections accordingly.

The CHAIRMAN. Mr. Walker?

Mr. WALKER. Mr. Chairman, as I stated in my opening remarks, my hope was that we could proceed forward with this bill in a bipartisan spirit and that we could ultimately end up with a bill that could be signed by the President and moved forward. Now we have a fundamental decision to make as a committee.

If we simply want to make an issue and have the President veto a bill, then this amendment is the sure way of achieving that. If that is our intent here, to find some issue that can be utilized by both sides politically but where we end up with nothing, then this amendment is the sure direction to go to achieve that result.

However, if we want to build and move ahead and actually have an ATP program which actually begins to have an impact on the ability of American industry to compete, then I would suggest that we have to reject this amendment. I say that simply because the General Counsel of the Department of Commerce has already circulated a letter indicating their strenuous objection to this amendment.

[The letter from General Counsel, Department of Commerce, follows:]

GENERAL COUNSEL OF THE
UNITED STATES DEPARTMENT OF COMMERCE
Washington, D.C. 20230

APR 9 1991

Honorable Robert S. Walker
Committee on Science, Space
  and Technology
House of Representatives
Washington, D.C. 20515-0536

Dear Mr. Walker:

This is to indicate the Administration's serious concerns about a possible amendment which may be offered at the markup of the American Technology Preeminence Act of 1991, which would authorize a $100 million loan program for the Advanced Technology Program (ATP) for FY 1992. We strongly oppose adoption of such an amendment.

We believe this amendment would undermine the basic objective of the ATP, which is to fund cooperatively, through grants with U.S. industry, research and development in high-risk, generic pre-competitive technologies. We are concerned that the loan program could not only decrease the incentive for companies to commit their own resources to high risk ventures, but could also result in their having much more short term goals due to loan repayment requirements.

Because of the high-risk nature of the proposals to be funded under the ATP and the significant number of small companies which are likely to be funded, we expect the default rate for such a loan program to be high. The loan program would also entail extensive overhead costs for the National Institute of Standards and Technology (NIST), which administers the ATP. For the purpose of scoring the program under the Omnibus Budget Reconciliation Act of 1990, we believe the loan program could score a significant amount of the loan authority due to the above-referenced costs and others we anticipate. A potential effect of this scoring could be to reduce possible availability of appropriations for the ATP cooperative grants program and NIST core research.

We also note that the ATP is still a relatively new program. NIST only recently completed the first ten awards totalling approximately $10 million. NIST is striving to meet the demands of the new cooperative grants program and to make it as effective and efficient as possible. The addition of a substantial new loan program could seriously impair these efforts.

The Office of Management and Budget has advised us that there is no objection to the submission of this report to the Congress from the standpoint of the Administration's program.

Sincerely,

Wendell L. Willkie II

Wendell L. Willkie, II
General Counsel

Mr. **Walker.** It is almost certainly a Presidential veto signal, given the language that was in this letter. I am going to ask the staff to distribute copies of the letter so that members who may not have seen that can review it because it does indicate that this is a problem.

You might say that the way the gentleman from California described it, it sounds relatively harmless. What in the world would the Administration be opposed to here?

First of all, let me suggest that what it does is moves us away from what we thought we were doing in the ATP program. We have agreed—the Administration has agreed and many of us who got into this issue have agreed—that what we need is a program to support high risk, generic, and pre-competitive R&D. We need to have some ability for companies to come in and share with the government the risks involved in doing those kinds of technologies.

The Mineta Amendment would grant loans for commercial demonstration, which is clearly then into the development area and gets us outside of where the ATP program was originally supposed to go. Some of you may decide that that is something that you would like to have as a part of this. Just understand that, at that point, you have lost then your coalition. You are pushing a concept which is then not a coalition concept. It is a single-minded kind of industrial policy sort of concept that does not have the broad-based bipartisan support that the bill coming out of subcommittee did.

In terms of what is best for the ATP program, the actual effect of this amendment—and understand this—the actual effect of the amendment, however unintended, will be to cut the existing grant program. The House-passed 1992 budget resolution specifically provides for a $7 million increase in three external NIST programs, of which ATP is one.

Current ATP funding being $36 million, the appropriators indicate something on the order of $40 million is the most that can be accommodated. The Commerce Appropriations Subcommittee expects a very unfavorable 602(b) allocation.

If, however, $10 million is held aside, as this amendment wants to do, to cover loan liabilities, 1990 funding for ATP will actually have to be cut from current levels down to probably $30 million. This is not what those of us who support the ATP concept want to do. We are hoping to have a steadily expanding amount of money available for the grant program. This amendment will have the effect of undermining that and cutting the grants in order to accommodate loan liabilities.

As I mentioned before, we need bipartisan consensus within the Congress and the Administration to move this bill and to move it quickly. However, the only effect of adopting this amendment will be to make the bill controversial and to end a lot of the bipartisanship that we have going into the action.

The result will be delayed action on the bill. Unfortunately, I think it will result in no bill at all.

We would be indeed snatching defeat from the jaws of victory if we proceed down this road. After two years of hard work, developing a detailed consensus on the bill, I would hope that we are not going to throw it away on an idea that certainly has merit with some people who share the gentleman from California's philosophy, but will end the bipartisan consensus and, therefore, the ability for this bill to ultimately succeed.

Thank you, Mr. Chairman.

Mr. **Mineta**. Will the gentleman yield?

Mr. **Walker**. I'll be glad to yield to the gentleman.

Mr. **Mineta**. One of the reasons I crafted this amendment was because there is a similar type of funding for research programs. That was contained in the 1990 Farm Bill. It was a provision that established an alternative agricultural research and commercialization program.

It is interesting to note that that was offered by our former colleague, Mr. Madigan. The President liked that provision in that Ag Bill, supported it, signed it into law, and not only did he like it, but he also asked the gentleman from Illinois to become the Secretary of Agriculture.

Now I don't expect my amendment to propel me into a Cabinet Post, but it seems to me that if the President liked it well enough to be able to incorporate it into the Ag Bill, then this is something that ought to also get the President's support because of the commercialization needs of our high tech industries, just as the President felt it was important to for the agricultural community.

In any case, the program has been reviewed carefully by the Congressional Budget Office and by all the budget people to make sure that it was in conformance with last year's budget agreement as it relates to credit policies and credit programs. So I hope that this amendment will not be veto bait, as our colleague from Pennsylvania suggests, since it was not veto bait on the agriculture bill as proposed by Mr. Madigan.

I appreciate your yielding the time.

Mr. **Walker**. I thank the gentleman. I would point out to him that the Administration feels very strongly about his amendment, but I don't expect my strenuous opposition to his amendment to propel me into a Cabinet Post either.

The point is that there is a substantive difference between what was being attempted in agricultural programs and agricultural research and what we are attempting to do here in terms of industrial policy. I know where the gentleman is coming from, but I would simply say that doing the high-risk, generic, pre-competitive kinds of research is what we aimed at doing here, and the gentleman is changing the character of the bill. I don't know whether that was true in the agriculture bill or not.

In this particular case, he does offer an amendment which is changing the character of what the consensus has achieved up until now. I think that is the major problem and one that is difficult to resolve.

Mr. **Valentine**. Mr. Chairman?

The **Chairman**. The Chair will recognize Mr. Valentine at this point.

Mr. **Valentine**. Mr. Chairman, I would like to say a few words in support of this amendment, the amendment offered by our colleague, Mr. Mineta. At the outset, I would like to also say to our esteemed colleague from Pennsylvania, the ranking member of the full committee, on the question of proxies, that we do have proxies.

I don't want to take advantage of anybody, but I intend to use them again if the need arises.

I thought they were and deem them to be lawful and within the rules of the committee. We certainly don't want you to think—well, we've got some, and if you've got any over there, you might be prepared to use them. That is in response to what you said earlier.

Mr. **WALKER**. If the gentleman would yield on that—

Mr. **VALENTINE**. I don't want to yield on that. Let me finish making my statement and then, if I have any time left, I will yield.

Let me say, Mr. Chairman, that I find it a bit unusual and hard to understand that the gentleman opposes a principle whereby the Federal Government stands a chance of getting some money back. By the amendment, we have converted part of this money into a loan arrangement rather than outright grants.

Mr. **WALKER**. Will the gentleman yield on that point?

Mr. **VALENTINE**. Let me finish, and then I will yield.

I would ask, in addition to expressing support for the amendment, that we include report language which indicates to this department—and perhaps to all others—that we intend for these loans to be repaid. I think the Federal Government too often does not act with the vigor of the private sector in attempting to redeem this money.

It would be an easy proposition, I believe, if they adopted the policy that money owed the Federal Government under loan arrangements of this kind, if they write a few letters and it is not repaid, if they turned these things over to the fresh young lawyers, if you'll pardon the expression, in this country on a contingent fee basis, they would get most of this money back.

To the merits, this is the same principle, as I understand it, Mr. Chairman, that was espoused by this committee in the last Congress when we went along with Mr. Walker's idea of recoupment. In both instances, the goal was to recover a substantial portion of the Federal investment. Recovery through a loan program is certainly more certain.

Finally, Mr. Chairman, let me say that as recently as yesterday, our subcommittee held hearings on the question of: what is it that the Japanese do that we don't understand or that we don't emulate? What are the things, one, two, three, four, that have caused us the problem with respect to the Japanese?

Whenever this problem is examined, we come back to the cost of capital. I suggest to you that we are probably the only country in the world that has not become more involved in the sort of thing that Mr. Mineta espouses. I suggest that it is a good idea and the committee should adopt the amendment.

Now, I will be happy to yield to the gentleman from Pennsylvania.

Mr. **WALKER**. I have a member over here who needs to go and wants to speak, so I will take some of my own time to correct some of the things the gentleman said.

The **CHAIRMAN**. The Chair recognizes the gentleman from Pennsylvania, Mr. Ritter.

Mr. **RITTER**. Thank you, Mr. Chairman.

First of all, I want to express my highest regard for the gentleman from California. He has studied the issue of going from R&D to commercial product. He realizes the impact of competition. He represents a portion of Silicone Valley, which is facing a monumental capital challenge, a cost of capital challenge, so I have to be very sympathetic with what is driving Mr. Mineta toward this amendment.

I also, as somewhat of a father of the ATP, have got to point out that we are just about crawling with the Advanced Technology Program. We started this fiscal year with $10 million. The Administration has agreed to go toward $40 million. I am not sure what the Appropriations Committee is about to do.

We are still gaining experience in this whole idea of pre-competitive stage R&D. By the way, we've won a victory with the Administration, those of us who are seeking to redirect the Federal R&D economy more toward underpinning America's global competitors out there and giving some support as opposed to just going so basic as to almost avoid supporting American industrial players in the global competitive wars. I think we've won something out there on this pre-competitive language that is now accepted by the Administration, generic, pre-competitive.

They are not prepared to go further, to be very honest with everybody here. They are not for anything that smacks of industrial policy, and a loan program is something that they will oppose quite vigorously. That would kill a bill that I think is important for us to pass.

I might add that some of the folks who are on the cutting edge of commercializing R&D, the semiconductor equipment manufacturers, cannot get capital. The Biotechnology Association, not the International Biotechnology, but the biotechnology companies, are for this. The semiconductor industry association is for this.

Quietly, people like the American Electronics Association — formally, they seem to be for this. I understand their motivation, the cost of capital to commercialize cutting edge R&D in this country is out of line with our competition.

What the gentleman from California is trying to do is absolutely important in the scheme of things. But I think what is inappropriate here is timing.

We are just crawling with advanced technology. We have problems with the appropriations process in the Appropriations Committee. We may not get our full $40 million from them.

This also entails the possibility of up to $100 million in loans, although it will depend on what OMB deems to be a default rate. If that rate is deemed to be 80 percent, then you will only get $10 million. If you would get the authorization offered by Mr. Mineta, if it is 10 percent, maybe you would get up to $100 million.

It seems to me that it is another issue for another time and that it is something we should be dealing with here in this committee. Lord knows we need a capital gains differential, particularly for patient capital.

With that, Mr. Chairman, once again let me express my sympathy with the gentleman from California and the idea that we need to crawl before we can walk. We need to walk before we can run.

The gentleman is up and running. He is ahead of us all, but I think the timing isn't now.

Mr. MINETA. Would the gentlemen yield?

Mr. RITTER. Yes.

Mr. MINETA. I appreciate your comments on this about timing, but I think that the other distinction I have in here is that the grant program is still an ATP program. The commercialization program as a loan would be operated at the NIST level. So the fact that it is a loan program and is not mandating NIST to have to make loans—they still have to exercise their judgment in terms of commercialization.

As you have indicated, we have letters from the semiconductor industry association in support of this amendment from Semiconductor Equipment and Materials International, SEMI, a group from the Aerospace Industries Association, from the Association of Biotechnology Companies, from Hewlett Packard, as a specific company, so there is broad support from the business sector, which is very entrepreneurially oriented, but they recognize that we need this other distinctive aspect of fine tuning, which is the commercialization aspect.

Thank you for yielding.

Mr. RITTER. I thank the gentleman for his substantive contributions. I would say that this group of associations is on the firing line. They do experience the shortage of patient capital and they will grab at what they can get if it's out there. But I am not sure that we are ready for it.

Also, the money would still come from Section 28, which is the ATP program and another concern I would have, frankly. I just don't think that our NIST friends—and they are our good friends and we respect them and their abilities—I just don't think they're bankers at this point. I don't think they are investment bankers. I don't think they are venture capital types. I just don't think that they have the kinds of skills that are necessary to carry this out.

Mr. WALKER. Will the gentleman yield on that point?

Mr. RITTER. I yield.

Mr. WALKER. I thank the gentleman for yielding.

I just want to point out that the last loan program done by the Administration of a similar nature—this is all the regulatory work that had to be done pursuant to that. What you have at NIST and what you have within the government are regulators, not investment bankers.

What you will get is a sheaf of paperwork for the loans. You will get very little in the way of understanding of the needs of the investment community and the entrepreneurial community. Once again, we could end up with a process that frustrates rather than enhances our ability to do the kinds of things that the gentleman from Pennsylvania referred to and the things that the gentleman from California—

Mr. MINETA. Would the gentleman yield on that point?

Mr. RITTER. The time is mine. I will yield to my colleague from California.

Mr. MINETA. I appreciate the comment. And if you think those are the regulations, you ought to see what they might be on this recoupment. Recoupment is going to have to go into profit. It is going to have to talk about each individual company's ability in terms of the line of the grant that they would be getting, and to me, that is even scarier in terms of recoupment and the kinds of regulations that is going to require compared to a loan program.

Loan programs are pretty simple. It is a judgment factor; no question about it. But in terms of rules and regulation, recoupment will be much worse.

Thank you very much.

Mr. **Geren**. Would the gentleman yield for another question, please?

Mr. **Ritter**. Yes, I yield to the gentleman from Texas.

Mr. **Geren**. The distinction between grants and loans as far as which one is or is not industrial policy is a distinction that is lost on me.

Mr. **Ritter**. If the gentleman would yield back—the grants to the Advanced Technology Program will be logged into the pre-competitive stage of industrial collaboration. In other words, you are not quite at the commercialization point, but you're getting there. It is to get you to the commercialization point.

The loans would be to commercialize. There is somewhat of a line there between research and development in getting to that plateau so you can assault the peak and actually assaulting the peak out in the marketplace.

Mr. **Geren**. Labeling one of those industrial policy and not the other, again, is a distinction that is lost on me, but I appreciate the explanation.

Mr. **Walker**. Would the gentleman yield?

Mr. **Ritter**. Yes, I yield.

Mr. **Walker**. The point is that in the pre-competitive phase, you are dealing with high-risk, generic technologies that will benefit a broad range of industry if developed. In the case of the loans, you are actually out picking winners and losers. You are saying: we think this one has a commercial potential, so therefore, we are going to pick it and we're going to give it special advantage from the government.

That then becomes industrial policy. The government at that point is picking winners and losers in the commercial marketplace, whereas, the program we are designing here, the ATP program, is developing a broad range of generic technologies that will be available to everyone within the industry to use.

Mr. **Ritter**. If I could just reclaim my time for a second, I will then yield to the gentleman.

We fought hard to get the concept of the Advanced Technology Program off the ground. It has been years now; it's been about four years and we are just at a stage where the recognition is there, budget-wise, from the Administration and I think from our colleagues in Appropriations as well. I am not sure that going this extra step is going to be helpful to the overall appropriations process.

The **Chairman**. The time of the gentleman from Pennsylvania has now expired.

The Chair recognizes the gentleman from New York, Mr. Boehlert.

Mr. **Boehlert**. Mr. Chairman, I am sort of genuinely torn as I look at this amendment and its intent, because when Mr. Mineta mentions that magic phrase, technology commercialization, I sit up and take notice. It may well be a good proposal for a later time—and I say that for a number of reasons.

First of all, I say it may well be a good proposal because I have learned by experience over the years that most of Mr. Mineta's proposals are sound proposals, and I have identified with many of them. But as I look at this and look at the emergence of the ATP program, a couple of things garner my attention.

First of all, I am concerned that if we adopt this, we might redirect the emphasis to short-term goals rather than long-term goals. If I think we fail in any way or any manner in the United States, it is that we are too short-term in our vision rather than being long-term.

If we look around the globe at our principal competitors, I think you will see plenty of evidence to prove that oftentimes, taking the long-range view is much more productive. Companies will be looking to make the next payment, and so they would be looking for an immediate return, which might be marginal rather than being willing to stick it out and go for the long-term, which might provide the biggest payoff.

Then, I think, you are going to set up within—and bureaucracy doesn't scare me; I kind of like bureaucrats and think they do a pretty good job for the United States Government, but the fact of the matter is, you are going to set up a new bureaucracy within the agency and within the department, and they are going to be under the gun, too. They are going to have some pressure. When you see these various proposals, we better go with the one that offers the best promise of paying back, because if there is default, it is going to look bad in our track record, and we know we are entering into a high-risk area.

There are going to be a lot of failures and few successes. But hopefully, the successes will really pay big dividends for the future of our competitive position.

In response to my colleague from North Carolina, Mr. Valentine, talking about the loan program offering some prospect of a payback to the United States Government, I wish to call attention to that portion of the bill that assures us that on successful ventures, we are going to get paybacks even from the grant program. That is very specific; that if the grant program results in a successful commercial venture, then the grantee will be obligated to pay back to the government not only the amount of the grant, but interest as well.

The other thing is pure, practical politics. I know we like to avoid discussions of pure, practical politics, but the veto threat—I must say to my ranking minority member—the veto threat doesn't really scare me. I've never seen a veto threat that I was afraid of, but the fact of the matter is that we've been sort of tenuous as we've tried to move forward with this ATP program. I think we have a pretty solid consensus on this committee.

Then, to enter at this moment, something new, a new proposal, which may well be a solid proposal—and I'm willing to explore that further with my colleague from California. I'm flirting with it;

he has already embraced it. But for all of the foregoing reasons, I think it would be wrong at this juncture to enter into this program.

The **Chairman**. The time of the gentleman has expired.

The Chair recognizes Mrs. Morella.

Mrs. **Morella**. Thank you, Mr. Chairman.

I just want to comment that I agree with what Mr. Boehlert has said. I think that Mr. Mineta is always very progressive in his ideas, and this is something that we may want to look at in the future.

Right now, my concern basically is, when we started off with the trade bill, we kept enhancing this. We gave them an added mission. They are fulfilling it exceedingly well.

But then, we seem to come up with obstacles and new programs and new ideas that we thrust upon them. My concern basically is what the costs are going to be that are going to take away from the major program and mission of NIST in setting up this whole loan program.

This had been mentioned by some of my colleagues—in setting up an extensive program of loans, then you are going to have to have a collection agency. In the meantime, you have had to make the decisions, and I think this should go to study for another year. In the meantime, I plan to vote against it.

The **Chairman**. The Chair appreciates the gentlelady.

Mr. **Valentine**. Mr. Chairman?

The **Chairman**. The gentleman from North Carolina is recognized.

Mr. **Valentine**. I would like to just make one comment.

I think that what I hear from some of our colleagues is that it is easier and less troublesome to give it away than it is to loan it. I think that is a very questionable argument for us to embrace in this committee and elsewhere. That is, that it is less bookkeeping, less trouble, if we just give it and kiss it goodbye than—

Mr. **Boehlert**. Would the gentleman yield on that point?

Mr. **Valentine**.—it is if we create somebody to have some promissory notes and to call people in and ask them to give a financial statement and to loan them the money and ask them to repay it.

Yes, I yield.

Mr. **Boehlert**. Let's keep our eye on the mission. What are we moving forward with ATP for? We are looking to encourage high-risk, generic pre-competitive research, and we are saying that it is a wise investment of the taxpayers' money to promote this type of endeavor.

We want people to be thinking long-range, not short-term. We get into trouble consistently as a nation because oftentimes, we can't see any farther than the end of our nose.

Mr. **Valentine**. Mr. Chairman, my colleague is taking too long on my time. I take back my time, and yield the rest of it to the gentleman from Louisiana.

[Laughter.]

Mr. **Hayes**. I believe I have the time if you would like to respond. Let me get this straight just so I understand what we're doing here.

We've got these generic needs that benefit the entire nation, that are long-term. We don't have enough patient capital, but there is a provision in this act that if they are successful, we get paid back. Who the hell from? Everybody?

In other words, if it is generic in a grant and benefitted everyone, do we assess everyone in their tax return and have them repay the government $1.50 with a little box on their 1040, or, are we not in fact saying that on successful programs, what we've really done, is sweep under the carpet a deal with a major company that benefitted in the form of a grant so we cut their costs down dramatically just for them? That is the impression I would get as a listener.

I suggest that the alternative is a much better one if you are looking toward commercialization and you'll take the recognition that capital is not only not patient, but is unavailable, not only in Silicone Valley but in Southwest Louisiana or any other area that is represented. With a banking system that is not functioning—the comment was made earlier: these people are not investment bankers. It's a good thing.

If they were, there would be no capital whatsoever because what investment banker is going to be an expert on semiconductors or have the nerve, with a bank that is undercapitalized and with regulators waiting in the lobby, to loan a dime for R&D for commercialization. The answer is no one. The answer is: the Japanese didn't loan the money to these firms, realizing in their assessment that the technology is worth it, so we export the ideas that later turn into commercialization that are then imported into our market place, and we wonder why our balance of trade is a problem and why the country is in a decline.

It appears to me that everyone on that side of the aisle has recognized that the gentleman from California has good ideas, but is ahead of his time. I suggest that his time ought to be about 11:30 this morning. We ought to pass the amendment and we ought to put the country ahead of its time instead of trailing.

By the way, I'm going to leave a proxy and I'll tell you why.

[Laughter.]

Mr. HAYES. This morning at 9:30, there is a Water Resources Subcommittee hearing chaired by that gentleman, Mr. Nowak, who is also not here. It involves removal of sediment that is more important to the 7th District of Louisiana than any other environmental problem other than wetlands, but it is at 9:30 just like this hearing. There is also an I&O hearing at Public Works on groundwater contamination—extremely important to my district.

Were it not for the ability to leave proxies, I would not have the ability to do the work of a Congress that finds it necessary to have committees meet opposite each other. In other words, the world is not C-SPAN. The fact of the matter is that you have a lot of different work to do and you ought to make yourself available where possible and where not, your obligation is to inform yourself on the issues.

I suggest that it is the process of informing yourself that a Congressman need turn to, not his physical presence always in the room when the demands are greater than can possibly be met in that way.

That was an interesting statement. I thank you all for listening.

[Laughter.]

Mr. **Walker**. Mr. Chairman?

The **Chairman**. The Chair recognizes the gentleman from Pennsylvania.

Mr. **Walker**. I want to make just a couple of points. We've had a lot of speeches from people who I don't think have really read the bill and don't understand what we're doing here.

First of all, the way we will know which companies we are going to recoup from is that they will have put invested money in up front. Part of this is a shared partnership between government and certain companies and so on.

It is true that what we will get out of that is generic technology, but if in fact, that company turns around and makes a profit on it, what we have said is that government ought to share in that largess. I think that is a responsible approach and it certainly goes differently from the direction the gentleman from North Carolina has talked about; that somehow, the loan program is the only way we're going to get any money back.

The fact is that we have a program in here to help do that with grants. But the fact is, the reason we are using grants, as the gentleman from New York points out, is that it is a long-term approach. It is the way of assuring these companies that there will be real money there and that are not simply going into another loan market.

Now I agree with all these people who have talked about the problems of the capital crunch. I would suggest to you that the gentleman's $10 million is not going to solve the capital crunch problem; nor is any amount of money this committee can possibly come up with going to solve that problem. That is a problem of policy.

We've got some policies in this country that have literally driven capital out of our market. If, as a Congress, we will correct those policies, we can in fact solve some of these problems. They are not going to be solved as a loan program in ATP.

The only point I would come back to is that the loan program may well cost us the grant program. If what we end up doing is killing our ability to make grants for this because we were insistent upon a loan program, then I think we have lost all the way around, and I just don't see the sense of losing everything for making a minor case about capital cost recovery.

Mr. **Mineta**. Mr. Chairman?

The **Chairman**. If the gentleman from California will indulge me, the other gentleman from California, Mr. Rohrabacher, has been seeking recognition. I would like to recognize him at this point.

Mr. **Rohrabacher**. I will yield to Mr. Mineta, Mr. Chairman.

The **Chairman**. The gentleman is willing to allow you to go ahead.

Mr. **Mineta**. I appreciate my colleague from California yielding to me at this point.

I think that, first of all, because of the concerns about ATP—we've heard this: well, we've got to crawl before we walk; we've got to walk before we run—I think that is part of the reason why I am not leaving this program in ATP. I am putting it in the larger agency, the National Institute of Standards and Technology, not the ATP program within NIST.

I think that NIST is the old National Bureau of Standards that we know. I think they have that broader view of the issues and they have experience in terms of what has to be done.

If you will recall, when we reformed the National Bureau of Standards to the NIST, we put a charge specifically authorizing NIST to "facilitate the more rapid commercialization" of advanced technologies as part of its mission. So what I am really doing is enhancing; I am not taking away from ATP. I am enhancing the program.

At the same time, in ATP, a grant program is a dollar in and a dollar over here. In this commercialization loan program, what I am doing is taking $10 million and leveraging it so that it will become a much larger program. Even if we have, let's say, an authorization that allows $100 million, we know that in the appropriations process, we are not going to get $100 million, so we are going to get a reduced amount.

The question is: given a reduced amount, how do we really maximize those resources. We do it with a grant program in ATP, and we can do it with a loan program, leveraging it, because the grant program is dollar for dollar—a dollar appropriated is a dollar spent—but a dollar in loan programs appropriated leverages into a larger amount available for the total loan program.

I think that what I am doing is enhancing the mission of the Department of Commerce and the National Institute of Standards and Technology in terms of commercialization. Again, I urge the adoption of my amendment.

I appreciate the forbearance and patience of my colleagues.

The CHAIRMAN. The Chair recognizes Mr. Rohrabacher.

Mr. ROHRABACHER. I think that it is very clear that there is a fundamental, philosophical difference on the sides of the aisle here. Apparently, a compromise had been reached on this prior to this amendment. As Mr. Walker is suggesting, this amendment may kill that compromise and kill that agreement and that understanding. The fact is that we recognize that there are philosophical differences.

One of our colleagues was just talking about his absolute lack of faith in the investment banking system in our country. Well, perhaps some people on this side have less faith in the bureaucracy and less faith in government and more faith in investment bankers. That is just a fundamental difference in philosophy between Republicans and Democrats.

I would suggest that Republicans are very, very hesitant to let the government get involved in the loan business and become basically a part of the business of loaning money. When those things happen, you have bureaucracy, paperwork, and we can go on and on. There is a difference in how we view these things.

Mr. MINETA. Would my colleague yield on that point?

Mr. ROHRABACHER. Yes.

Mr. MINETA. You're not saying that you are extolling the virtues of the savings and loan industry, are you?

Mr. ROHRABACHER. I would think that when the government got involved in the savings and loan industry, it screwed it up royally in the same way that we may royally screw up things if we get involved in this type of operation.

Mr. **Mineta**. It came as a result of the deregulation of the financial institutions.

Mr. **Rohrabacher**. Again, Mr. Chairman, these things indicate a fundamental, philosophical difference. For example, people on this side of the aisle tend to believe that when the deposit insurance of that industry was dramatically increased, that is what caused or precipitated the problem.

Let us recognize that we have honest disagreements among each other. That doesn't mean that I'm right and you're wrong, or vice versa. If we have reached a consensus based on the way this bill existed before this amendment, and we are being told that the consensus which was made with an understanding of our differences will be breached with this amendment, then let's take that very seriously.

I have just one last thought in terms of $100 million— I mean, that is nothing. That amount of money is not going to make a major change in our country's ability to meet this challenge. What we really have to look at are some fundamental changes.

For example, the Japanese have no capital gains tax whatsoever. Many of us have been pushing for that reform. We've been pushing reforms to reduce regulations. We've been trying to talk about incentives to put into the tax system so that, instead of having government make decisions, there will be actually a restructuring of our system so that private enterprise can meet the challenge.

This, again, is exemplary of the difference in philosophy between this side of the aisle and that side of the aisle. I suggest that this amendment be defeated and that we stick with the consensus understanding the philosophical differences between us and trying to accomplish what we can.

The **Chairman**. The Chair would like to point out that we have devoted a considerable amount of time to this amendment, and properly so. It is, as I said, the most important amendment before us, but I would beg your indulgence in trying to bring this debate to a close as quickly as possible.

Mr. **Schiff**. Mr. Chairman, may I add one concluding thought?

The **Chairman**. The Chair recognizes the gentleman from New Mexico, Mr. Schiff.

Mr. **Schiff**. Heeding the Chair's call for brevity, I will be very brief. I can't resist saying that this side of the aisle and that side of the aisle contain a lot of individuals, and the individuals don't always have the same philosophy.

As a general principle, I am not so sure that there is less paperwork in a loan than in a grant. I think that the government getting repaid is probably better than the government not getting repaid, in general. But I have become convinced that this program is so new and so innovative that in order to encourage private enterprise to invest, we are better off with a grant program at this time. If we are successful, then I think the argument for converting to a loan program would make sense at some future time, but I think we are not there.

Thank you, Mr. Chairman.

The **Chairman**. Thank you, Mr. Schiff.

Does the gentleman from New York desire a final word?

The Chair would like to indicate that he desires to make a few statements in concluding the debate, but I will try to be brief also.

Mr. **Boehlert**. Mr. Chairman, I'm sure the irony of this debate has not been lost on anyone in this room; the Republicans arguing for grants and the Democrats arguing for loans, but having said that, I just don't think we are providing enough money for the grant program for what we envisioned under this legislation. I am afraid that Mr. Mineta's well-intentioned proposal, which I will once again say that I am flirting with but will not vote for at this time, would diminish the grant program. And that is where the need is right now.

The **Chairman**. The Chair thanks the gentleman.

The debate has been extremely good. I think we have covered most of the bases, but the Chair would like to add a few words.

First of all, this is an extremely important program that we are discussing. It is one of probably only two or three areas within the jurisdiction of this committee where we are seeking to push the Administration a little bit beyond the level at which it seeks to go.

I recall to the members the history of this Advanced Technology Program. It is incorporated in the 1988 Trade Act. It was one of the last bills signed by President Reagan.

Prior to being incorporated in that act, it was debated and the principles involved in the program were considered for several years. After the act was passed, there was still a considerable time lag before anything was done about the program. It was authorized, but no money was requested; nor was any money spent.

As a result of considerable progress in the thinking of the Administration as well as continued progress in the thinking of many members of this committee, we finally began to see some action with regard to the broad problem of how the government could effectively be involved in helping to correct this failure of the U.S. economy to adequately support advanced technology development in a timely fashion, so as to be able to compete with the rapid methods by which the Japanese and others move from research into advanced technology and commercialization. This is aimed at taking a step in the direction of correcting that problem.

The Administration, which was extremely reluctant to undertake anything that smacked of industrial policy or picking winners and losers, finally announced in January a technology policy which included the language that has been quoted here; that we will support a program of pre- competitive, generic, enabling research and development which will help us to meet this problem. That was a term of art. It was meant to preclude the picking of winners and losers, but to move up to the edge of it as far as we were able to define it.

Mr. Walker and many on the Republican side, I think, perhaps with a feeling that they are going to be rolled if they don't maintain that line, are making a point that this is an important line to defend and pointing to the threat of a veto. Now I have worked very hard to cultivate a cooperative approach to this, an understanding that we need to continue to move forward, but to do so in a prudent and reasonable fashion.

I am very pleased and happy to have had the support of Mr. Walker in getting to the point where we are. I would be extremely disappointed if this bill was to go down the tubes because we tried to take it a step further than we could expect the Administration to support.

I am not convinced that amendment, however, passes beyond that stage. I don't have enough information at this point.

I participated in the writing of those provisions in the Agriculture Bill which were aimed at furthering new agricultural technologies, for example, and which had the support of both the majority and the minority on the Agriculture Committee. I point out that the culture in the agriculture community is different from that of the high tech community, generally speaking.

The Agriculture Department has a long history of making grants and loans to farmers and to others. That culture is not included in most of the rest of the technology industry of this country. You can make that distinction, but I am aware of other examples in which the line is a little fuzzy, at least, as to how far we should go in this process of trying to assist American industry of all kinds.

I am going to take this position; that I am going to support this amendment, and I think it is a good amendment. Its only problem may be that it is premature or that it would invite a veto. If I find at any point during the course of this legislation that that is the situation, I might offer to drop this amendment or any other similar provisions that would threaten the passage of this bill up to the last minute, including final passage in the House, conference with the Senate, or agreeing to the conference report after we bring it back.

I want to get this bill out. It is an important step. We have come a long way to get to this point and to have the broad, bipartisan support that we do have.

I am willing to take one additional little gamble to see if we can't convince the Administration and Mr. Walker and the minority that this is not going to sink the ship. I hope that we can succeed in doing that.

Is there any further debate on the amendment?

Mr. Mineta. I call for the question.

The Chairman. The question is called for. All those in favor of the amendment, will signify by saying aye.

[Chorus of ayes.]

The Chairman. Opposed, no.

[Chorus of noes.]

The Chairman. In the opinion of the Chair, the ayes have it.

Mr. Walker. Division, Mr. Chairman.

The Chairman. Division is requested. All those in favor of the amendment, will raise their right hands.

[Show of hands.]

The Chairman. All those opposed?

[Show of hands.]

The Chairman. The clerk will report.

The Clerk. Mr. Chairman, I count 15 ayes and 13 noes.

The Chairman. There being 15 ayes and 13 noes, the Chair declares that the amendment is passed.

The Chair will proceed to the next amendment. The remainder of the amendments, while important, are not all that controversial.

The next amendment is the Fair Packaging Metric Amendment. That is amendment number C. This is offered by the Chairman.

What this amendment would do is to make metric the primary measurement system under the Fair Packaging and Labeling Act, but would also allow dual measurement in English units if a manufacturer so desired. It has no substantive effect on the Fair Packaging and Labeling Act.

All other provisions of the act are unchanged, but this conforms to the overall metric law of the United States, which states that metric will be the preferred unit for use in this country.

Is there any further debate on the amendment?

Mr. WALKER. Mr. Chairman?

The CHAIRMAN. Mr. Walker.

Mr. WALKER. Mr. Chairman, I have some concerns about the amendment. Maybe I am misreading it, but first of all, it seems to me that we are placing an additional burden on business here.

There has been an estimate that this is going to impose additional costs. I have no idea what additional costs may be. I am not aware of any study or survey that has been done of business to find out what the additional costs may be, and since we have not held hearings on the provision, I don't know what they may be. I think that there is a question in my mind at the time about starting to impose additional costs on businesses that are already struggling in the midst of a recession right now with this kind of an amendment.

Second, the language as I read it, would make metric labeling mandatory, with no provision for an alternative English measurement system. It is mandatory language and the alternative is not there. That concerns me.

Then third, I don't know who out there is clambering for this. As far as I know, we do not have consumers clambering for this kind of metric conversion. They have been less than friendly to metric mandates in the past when we've tried it on road signs and other things. I have heard from no one who is suggesting that we ought to do this.

If it is business, in terms of trade competitiveness, it seems to me that all of those who are trying to be internationally competitive know what is best for them in terms of profitability, and those that find that that is a useful thing to do, have gone that direction without any mandates from the government.

Fourth and finally, with the idea of moving this legislation, I think this one gives us some jurisdictional problems with the Energy and Commerce Committee, and I would hate to see our work end up being thrown to Energy and Commerce because of something that we adopt here.

I do have those concerns about this particular amendment. I would simply like to have them on the record.

The CHAIRMAN. The Chair would like to respond to the gentleman briefly.

First, he is aware of the fact that this is a potential overlap of jurisdiction with the Commerce Committee and has written to the chairman of that committee asking him to recognize the possible overlap and suggesting that it does not affect their jurisdiction over the Food and Drug Act or the Fair Packaging and Labeling Act, and that we recognize their jurisdiction and hope that he won't ask for sequential referral.

With regard to the cost, I have a letter here from the Food and Drug Administration, Acting Chief of the Economic Section, which I would like to insert into the record. The pertinent part says: if food producers are able to incorporate metric declarations with changes required by the Nutrition Labeling and Education Act of 1990, which requires that they make changes in their labeling anyway, then the incremental cost of adding the metric would be minimal.

[The letter referred to follows:]

DEPARTMENT OF HEALTH & HUMAN SERVICES Public Health Service

Memorandum

Date [illegible] 22 1991

From Richard A. Williams, Jr., Ph.D.
Acting Chief, Economics Section, Food and Drug Administration

Subject Metrication of Food Labels

To James R. Taylor
DHHS Representative, Consumer Affairs Subcommittee
Metric Operating Committee

In response to your question concerning the metrication movement in food labeling, if the Fair Packaging and Labeling Act (FPLA) were to be amended to provide for "metric only" declarations of net quantity, it would be prudent for the effect of the amendments to occur with the effectiveness of the new requirements of the Nutrition Labeling and Education Act of 1990 (NLEA). If food producers are able to incorporate metric declarations with changes required by NLEA, the incremental cost would be minimal. However, if the label changes are to occur at a later date, the incremental cost of metrication would be in excess of $300 million. This figure includes the costs of administrative activities ($150 million), printing ($100 million), and label inventory disposal ($100 million). These costs are calculated based on certain assumptions regarding the scope of the action and the amount of time allowed until enforcement and on data estimated in Compliance Costs of Food Labeling Regulations, a report prepared for the Department of Health and Human Services, Food and Drug Administration, by Research Triangle Institute.

Richard A. Williams, Jr., Ph.D.

The CHAIRMAN. If we postpone action to a later date so that there is a complete turnover of labels required, then the cost becomes substantial. It is as an effort to avoid this substantial cost as a result of poor timing on our point that we want to move ahead at a time when the costs would be minimal since they are changing the label requirements anyway.

Mr. WALKER. Would the gentleman yield on that point?

The CHAIRMAN. I'd be glad to yield.

Mr. WALKER. My concern is that there are a number of industries that have already moved ahead to change their labeling and have already taken care of that, so this would impose additional costs upon those who have already attempted to comply. Secondly, this is an industry-wide provision, as I understand it, on all packaging, so it goes well beyond just that particular segment of business. Therefore, it has costs beyond what is being referred to there.

I understand the point that is being made, but for some businesses that have attempted to be on the front side and that have already complied and have gone well beyond what the government asked for, this could impose additional costs. I remember when I was involved in some nutritional labeling legislation some years ago, that that is a substantial cost to these businesses when you start talking about changing the labeling on all of their packages.

The CHAIRMAN. Is there any further debate on the amendment?

Mr. VOLKMER. Mr. Chairman?

The CHAIRMAN. Mr. Volkmer is recognized.

Mr. VOLKMER. I would like to ask the staff just so I understand: what packaging does the Fair Packaging and Labeling Act cover? What packaging?

Mr. TURNER. Consumer packaging in general, across the board.

Mr. VOLKMER. And as I understand it, Mr. Chairman, I see no effective date on this amendment, which means, I guess, that it goes into effect when the bill is signed into law?

The CHAIRMAN. That is correct.

Mr. VOLKMER. Now what happens to my plant down in Hannibal that has two years' supply of packaging for, say, fertilizers? What do they do with those? Do they have to send them back and have them reprinted?

I have some practical problems with this amendment like Mr. Walker.

The CHAIRMAN. Yes. We recognize the importance of the practical problems resulting from any change of this sort. It is our intention that this would not require the changing of labels already in the flow of commerce, but only changing at the point where they are being packaged.

Mr. VOLKMER. Yes, but a lot of these manufacturing firms have empty packages already printed up and in stock in their inventory ready to be packaged. I am just wondering about those?

The CHAIRMAN. Can you respond to that, Mr. Turner?

Mr. VOLKMER. I mean, if we could put a date on here, say—it would be less onerous to me if you give them sufficient time in order to prepare the new packaging with these labels, the dual printing if they want to do so, or the metric. Say if this thing becomes law on October 1st, the President signs it on October 1st—

are those people going to be out of compliance if they package on October 2nd something that doesn't have the metric on it?

The **Chairman**. Mr. Turner?

Mr. **Turner**. We don't have a copy of the Fair Packaging and Labeling Act with us, so we don't know what the transitional provisions are in the act for when it went in in the first place.

I think the gentleman is correct that the amendment of Mr. Brown's does not have an effective date in it and that that part of it was not addressed.

The **Chairman**. I would just say, Mr. Volkmer, that we already have passed legislation requiring the change in labeling under the Nutrition Labeling and Education Act of 1990. It is the view of the Department of Health and Human Services in the letter that I indicated to you that this would be integrated with those already required changes of labeling and the costs would be minimal. The same transition rules would apply to this change as would apply to the other changes that will have to take place as a result of the already-passed legislation.

Mr. **Volkmer**. Doesn't that already-passed legislation only have certain applications, not to all packaging? This would apply to all packaging.

Mr. **Walker**. If the gentleman would yield—it is my understanding that if somebody is packaging nails, say, for sale in a hardware store that this particular provision would deal with that. So to the packages of nails that someone is doing has nothing to do with food and nutrition, but that package of nails would have to be covered and would have to have a metric label on it now under this provision.

That is my concern. A lot of those kinds of businesses have packaging that they buy for literally years in advance because they don't anticipate any need to change packaging on something that is a hard good.

Mr. **Volkmer**. I don't know if they would be years in advance, but I know they have—at least the manufacturing plants that I visit in my district—have quite a bit of inventory of packaging they are going to use. I am sure that most of them are going to be caught quite unawares of all of this.

That's what bothers me; that there is a good possibility, if they want to comply—and I don't know what the penalties in the Fair Packaging and Labeling Act are—but I would hate to see somebody out there be in violation of the law inadvertently because of something we do here, not intentional at all, but just in the course of business.

The **Chairman**. The Chair would like to suggest that it was not his intention to create a hardship on industry with this. He was accepting the letter from the department of its having minimal costs if integrated with the changes required by the Nutrition Labeling and Education Act as assurance of that.

I now have some questions as to whether that is actually the case in view of the points that have been raised. I will withdraw the amendment and try to resolve this problem as to adequate transition rules.

If we can draft a modification that will meet the gentleman's problems—

Mr. VOLKMER. I would agree to that. In fact, I would have gone further and let it in as long as the Chairman would work with us.

We'll do it this way now. I will be glad to work with the Chairman to assure that somehow we don't adversely affect the people out there that have packaging already prepared.

The CHAIRMAN. The Chair is prepared to offer an amendment which will state that this legislation shall take effect on January 1, 1993 and shall not apply to packages already printed.

Mr. VOLKMER. January 1, 1993?

The CHAIRMAN. Yes.

Mr. VOLKMER. Are you offering that as an amendment to your amendment?

The CHAIRMAN. Yes; and shall not apply to packages already printed.

Mr. VOLKMER. That is a lot better. All right.

The CHAIRMAN. Is there objection to the amendment that the Chair offers which he has in writing in front of him?

Mr. WALKER. Just a question on that is: how are we going to determine whether or not the packages are already printed?

The CHAIRMAN. We'll hire a new bureaucracy.

[Laughter.]

[The amendment offered by Mr. Brown follows:]

(c)

BROWCA027

AMENDMENT TO THE COMMITTEE PRINT
OFFERED BY MR. BROWN OF CALIFORNIA

Page 13, after line 19, insert the following new section

SEC. 107. METRIC AMENDMENT.

The Fair Packaging and Labeling Act (15 U.S.C. 1451 et seq.) is amended--

(1) in sections 4(a)(2), (4), and (5), 4(b), and (5)(c)(1), by striking ``weight'' and inserting in lieu thereof ``mass'';

(2) in sections 4(a)(5) and 5(d), by striking ``weights'' and inserting in lieu thereof ``masses'';

(3) in section 4(a)(2), by inserting ``, using the most appropriate units of the SI metric system as the primary system for measuring quantity'' after ``panel o that label''; and

(4) in section 4(a)(3)(A)--

(A) by striking ``containing'' and inserting in lieu thereof ``that also displays the avoirdupois system of measure, and that contains'' in clause (i)

(B) by inserting ``that also displays the avoirdupois system of measure'' after ``random package'' in clause (ii);

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(C) by inserting ``that also displays the avoirdupois system of measure'' after ``linear measure'' in clause (iii); and

(D) by inserting ``that also displays the avoirdupois system of measure'' after ``measure of area'' in clause (iv).

Redesignate subsequent sections accordingly.

Mr. **Walker**. That's what I'm afraid of.

I understand that the Chairman is trying to correct it and it certainly would be a step in the right direction. I am supportive, but I just want all to understand that we may be creating problems.

If somebody ends up in a non-compliant situation, they are, of course, going to claim that it was a package that they had printed a long time back. That seems to me to affect your enforceability substantially.

Mr. **Volkmer**. I would like to say, Mr. Chairman, that I think with all the concerns out here that I have of the packaging by manufacturers especially—those people are normally members of some group, whether it is Chamber of Commerce or some other group, and if this passes, they are going to get notification. I don't think I have very many in my district that would have a two-year supply on hand. I doubt if they would stock up that much and take up that much warehouse space.

The **Chairman**. In effect, this gives them a three and a half year lead time on it, because it doesn't go into effect. Then it shall not apply to anything already printed.

Mr. **Walker**. If I might suggest—and it is just a suggestion—that we do it two years after the enactment of the bill. The problem is that if this bill would happen to slide over into the next session of Congress and end up being late in the session, we could be at October of 1992 before we ended up passing this. Therefore, the January of 1993 date could, in fact, be only a couple months away. If we could do it where it says two years after the enactment, that would probably give adequate time for most people to do transitional planning.

The **Chairman**. The Chair accepts that modification.

Is there any further discussion on the amendment? If not, all those in favor, signify by saying aye.

[Chorus of ayes.]

The **Chairman**. Opposed, no.

[No response.]

The **Chairman**. The ayes have it and the amendment is adopted.

The Chair has an additional amendment with regard to the submission of research and development paperwork to the National Technical Information Service. The intent of this amendment is to make sure that all of the appropriate documents generated as a result of Federally-funded research and development are made available to the one depository, which is the National Technical Information Service.

This is a matter that has raised a number of questions in the past when important agencies of the government have not seen fit to submit all of their research documentation, reports, and so forth, to the NTIS. It makes it extremely difficult to make sure that the public has access to the fruits of the research that they have financed through their taxes. We urge the adoption of this amendment.

Any debate? If not, all those in favor, signify by saying aye.

[Chorus of ayes.]

The **Chairman**. Opposed, no.

[No response.]

The **Chairman**. The ayes have it and the amendment is agreed to.

[Amendment d follows:]

(d)

BROWCA012

AMENDMENT TO THE COMMITTEE PRINT
OFFERED BY MR. BROWN OF CALIFORNIA

Page 13, after line 19, insert the following new section:

SEC. 107. TRANSFER OF FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION.

(a) TRANSFER.--The head of each Federal executive department or agency shall transfer in a timely manner to the National Technical Information Service unclassified scientific, technical, and engineering information which results from federally funded research and development activities for dissemination to the private sector, academia, State and local governments, and Federal agencies. Only information which would otherwise be available for public dissemination shall be transferred under this subsection. Such information shall include technical reports and information, computer software, application assessments generated pursuant to section 11(c) of the Stevenson-Wydler Technology Innovation Act of 1980 (15 U.S.C. 3710(c)), and information regarding training technology and other federally owned or originated technologies. The Secretary of Commerce shall issue regulations within one year after the date of enactment of this Act outlining procedures for the ongoing transfer of such information to the National Technical Information Service.

(b) ANNUAL REPORT TO CONGRESS.--As part of the annual report required under section 212(f)(3) of the National Technical Information Act of 1988, the Secretary of Commerce shall report to Congress on the status of efforts under this section to ensure access to Federal scientific and technical information by the public. Such report shall include--

(1) an evaluation of the comprehensiveness of transfers of information by each Federal executive department or agency under subsection (a);

(2) a description of the use of Federal scientific and technical information;

(3) plans for improving public access to Federal scientific and technical information; and

(4) recommendations for legislation necessary to improve public access to Federal scientific and technical information.

Redesignate subsequent sections accordingly.

The **Chairman**. Mr. Valentine has an amendment, amendment number E.

Mr. **Valentine**. Mr. Chairman, every member has a copy of the amendment. To the best of my knowledge, the amendment is noncontroversial, but we shall see.

It allows agencies of the Federal Government to give research equipment, including computers, which are no longer of use to the government—and I underscore that—which are no longer of any use to the government, to schools and other nonprofit organizations where they might be of some use.

This policy has worked well in the Department of Energy for years, and I believe it is time to give other agencies the right to make similar gifts. This is an easy but important way to improve science education in our country, and I urge the support of my colleagues.

This came to my attention because in our district, in Research Triangle Park, it was discovered that an agency of the Federal Government literally had a warehouse full of equipment that was obsolete, but there was nothing the agency could do with it accept suffer it to sit there and rust.

I will be glad to refer any questions to the appropriate staff person.

[The amendment offered by Mr. Valentine follows:]

(e.)

VALENT012

Amendment to the Committee Print
Offered by Mr. Valentine

Page 28, after line 17, insert the following new section:

SEC. 303. RESEARCH EQUIPMENT.

Section 11 of the Stevenson-Wydler Technology Innovation Act of 1980 (15 U.S.C. 3710) is amended by adding at the end the following new subsection:

``(i) Research Equipment.--The Director of a laboratory, or the head of any Federal agency or department, may give research equipment that is excess to the needs of the laboratory, agency, or department to an educational institution or nonprofit organization for the conduct of technical and scientific education and research activities. Title of ownership shall transfer with a gift under this section.''.

Redesignate subsequent sections accordingly.

The **Chairman**. Are there any questions or comments with regard to Mr. Valentine's amendment?

Mr. **Walker**. Mr. Chairman, we have no objection to the amendment. It is a good amendment.

The **Chairman**. If not, all those in favor, signify by saying aye.

[Chorus of ayes.]

The **Chairman**. Opposed, no.

[No response.]

The **Chairman**. The ayes have it and the amendment is agreed to.

Mr. Walker has amendment number F.

[The amendment offered by Mr. Walker follows:]

(8)

(Preeminence)

Amendment offered by Mr. Walker

On page 28, line 25, strike the words "cost of" and insert in lieu thereof the words "costs of salaries and associated benefits of the employees who administer."

Mr. **Walker**. Mr. Chairman, I don't believe there is any controversy about this amendment. This is an attempt to make certain that the Malcolm Baldrige Quality Award Program does not in the future end up with an escalation of appropriated costs given the language that we now have in the bill.

There is an attempt to make certain in the bill that some appropriated money can be used for Malcolm Baldrige. They are prevented from doing that at the present time. The problem was that there was some interpretation that you could not use it for employee salaries and other benefits that would be related to the granting of the Baldrige Awards.

There was an attempt by the subcommittee to take care of that, but what we have done now is we have made an open-ended allocation to the Malcolm Baldrige Awards for appropriate money. All my amendment does—it's a technical amendment— is to limit the costs under appropriated monies to employee salaries and benefits only.

I have checked with NIST and they tell me that these are the only things that need to be covered by appropriation for the sake of precision and to prevent an escalation of appropriated costs. I would define the cost to specifically include salaries and benefits. This would give NIST the legal authority it needs to continue the program in the manner in which it is currently undertaken. This is also fully consistent with the existing statutory requirement that the award program costs come from private sources.

The **Chairman**. The Chair has reviewed the amendment of the gentleman from Pennsylvania and has had a recommendation from the staff that it is a valuable amendment, and urges that the committee adopt the amendment.

Mr. **Valentine**. Mr. Chairman?

The **Chairman**. Mr. Valentine is recognized.

Mr. **Valentine**. Mr. Chairman, I want to say that it causes me a great deal of pain, but I support the amendment.

[Laughter.]

The **Chairman**. Any opposition over here? If not, all those in favor of the amendment will signify by saying aye.

[Chorus of ayes.]

The **Chairman**. Opposed, no.

[No response.]

The **Chairman**. The amendment is agreed to.

The Chair would like to recognize Mr. Valentine to put the cap on this process.

Mr. **Valentine**. Mr. Chairman, I move to strike the text of all after the enacting clause of the committee print and to substitute therefore the text of the bill as amended by the committee.

The **Chairman**. You've heard the motion. All those in favor signify by saying aye.

[Chorus of ayes.]

The **Chairman**. Opposed, no.

[No response.]

The **Chairman**. The ayes have it and the text as amended will be substituted for the bill.

We now have two proposed additions to report language. I recognize Mrs. Morella.

Mrs. Morella. Thank you very much, Mr. Chairman. This is non-controversial report language.

Mr. Chairman, in 1987, this committee authorized a five- year project at the National Institute of Standards and Technology to demonstrate an alternative personnel management system. The purpose of this project was to provide NIST with a mechanism to compete with the private sector in the hiring and the retention of high-quality researchers.

Since its inception, the personnel management system has far exceeded the expectations of both NIST and this committee. The project has been an absolute and unqualified success.

It has been so successful, in fact, that I intend to work very closely with the Post Office Civil Service Committee on which I also serve and to offer an amendment on the House Floor during consideration of the bill that would continue the extension of this very important program at NIST.

I am now offering report language documenting the great successes of the personnel management system. This demonstration project has allowed NIST to compete more effectively with the private sector in the highly competitive scientific and technical labor market.

For example, before the demonstration project went into effect, NIST had a longstanding engineering list of vacancies because the agency was not able to compete with local engineering firms. NIST is now able to recruit, hire, and retain topnotch employees in this area. As a result, NIST managers have significantly improved their ability to hire outstanding personnel and have been much more effective in compensating and retaining their own scientists and engineers with unique and sometimes scarce technical skills and expertise. They have also actually been able to beat out several large private sector companies in luring outstanding key personnel to this world-renown scientific institution.

The personnel demonstration project has given NIST the flexibility it needs to compete. The program has clearly proven its merit and deserves to be extended. I urge my colleagues, Mr. Chairman, to support the report language and the extension of the NIST personnel system.

Thank you, Mr. Chairman.

[The report language offered by Mrs. Morella follows:]

(a)

Report Language
to the
American Technology Preeminence Act

Offered by Mrs. Morella

The Committee is pleased with the success, over the past five years, of the Demonstration Project at NIST. It has met the expectations of the Committee when the authorizing legislation was first passed. Moreover, the Committee expects that the project will be extended.

The following is a listing of the successes of the Demonstration Project:

NIST Demonstration Project Successes

Specific Instances of Project successes are presented below, organized by Project interventions.

RECRUITING ALLOWANCES:

Under the Project, a recruiting allowance of up to $10,000 may be paid, in a lump sum or in increments, to candidates for hard-to-fill positions. So far, 18 recruitment allowances, averaging slightly over $5000, have been paid. The policy is that a recruitment allowance will not be paid unless it is needed to attract a well-qualified candidate; therefore, all recruitment allowances have been effectively applied. Examples are the following:

- an allowance of $6000 paid to a Ph.D. physical scientist from a private firm to take a position with the Building Materials Division. Because of his high salary at the firm and because of the high cost of housing in Montgomery County, the cash bonus was essential and effective.
- an allowance of $2000 granted by the Ionizing Radiation Division was instrumental in attracting one of the few black Ph.D. physicists to enter the job market in 1988.
- The Electronics Technology Division used a recruiting allowance of $10,000 to attract a Ph.D. electronics engineer for the Lightwave initiative.

FLEXIBLE ENTRY SALARIES OF PAY BANDING:

Under the Project pay band system, an entry salary for a new hire may be set anywhere in the entry pay band, which also offers a broader range of pay than grades. This flexibility allows managers to negotiate more effectively with highly qualified candidates and compete more successfully in the market. Under the former system, entry salaries had to be set at step 1 of the entry grade and could be set at a higher step only after approval by OPM. Examples of the successful application of flexible entry salaries are the following:

- three Ph.D. mathematical statisticians hired by the Computing and Applied Mathematics Laboratory after a national search in a highly competitive market. The flexible entry pay of pay banding allowed the Laboratory to compete successfully against DuPont in one hire, against General Motors Research in another hire, and against a west coast environmental studies office in the third.

- a Ph.D. mechanical engineer who graduated from the California Institute of Technology received an offer from a private firm higher than the initial offer made by the NIST Fire Suppression Group. With the flexible entry pay authority, NIST was able to raise the offer to a level acceptable to the candidate.
- a female M.A. fire prevention engineer was hired into the Fire Measurement and Research Division with the help of flexible entry pay.
- the perennial problem in finding an adequate number of security guards was alleviated by flexible entry salaries, and during the war with Iraq, when security at federal agencies was suddenly increased, flexible entry salaries were essential in hiring temporary guards.
- a computer scientist was hired into the Fire Measurement and Research Division with the help of flexible entry pay.
- an engineering technician with an associate degree from Capitol College was hired into the Fire Science and Engineering Division with the help of flexible entry pay.
- a physical scientist and a physicist with scarce technical specialties hired into the Asbestos Analysis Project with the help of higher-than-minimum entry salaries.
- a leading biologist retiring early from Ciba Corning with 35 patents and over 100 publications hired into the Biotechnology Division. Flexible entry pay enabled the Division to compete successfully against other offers.
- a computer scientist was hired into the Computer Security Division after the flexible entry pay allowed the hiring official to better an offer from the private sector.
- a female Ph.D. computer specialist was hired into the Information Systems Engineering Division with the help of a higher-than-minimum entry salary.
- a Ph.D. theoretician in chemistry was recruited and hired by the Molecular Theory Group of the Molecular Physics Division with the help of flexible entry salary.
- two Ph.D. physicists with unusual backgrounds in precision measurement were recruited quickly to fill urgent needs in the

Quantum Metrology Division with the help of negotiated entry salaries.

- flexible entry salary helped the Ionizing Radiation Division hire one of the few black Ph.D. physicists to enter the job market in 1988.

- with higher-than-minimum salaries, the Plant Division was able to fill an electrical engineering position, which had been vacant for years, and a mechanical engineering position.

- the Ceramics Division cited flexible entry pay as a critical factor in hiring a female Ph. D. materials research engineer and a Ph.D. research chemist with scarce qualifications in solid state nuclear magnetic resonance analysis.

- after a year of searching for a chemical engineer with experience in molding of composite materials, the Polymers Division was able to hire a Ph.D. chemical engineer by offering $47,000 ($7,000 more than under the prior system) to successfully compete against a $52,000 offer from the private sector.

- the Electricity Division used negotiable entry salaries to hire seven recent B.S. and Ph.D. graduates in electrical engineering and physics.

- the Semiconductor Electronics Division cited flexible entry pay as the critical factor in filling a supervisory position with a Ph.D. physicist recruited from a university position.

- the Electromagnetic Fields Division used negotiated entry salaries make four significant hires: (1) two outstanding new graduates in engineering; (2) a highly qualified Ph.D. electronics engineer recruited from the Ball Corporation; (3) an M.S. electronics engineer who had several good offers from the private sector; (4) a uniquely qualified Ph.D. physicist employed by Delft University in the Netherlands.

- The Electromagnetic Technology Division cited flexible entry pay in successfully recruiting a Ph.D. electronics engineer and two Ph.D. physicists for the Lightwave initiative.

AGENCY-BASED HIRING

The issue before the project was that NIST had to go through OPM registers before filling a position, unless the position was an engineering or higher-level physicist position that qualified for direct-hire. This led to three problems: (1) time delay; (2) the lack of qualified candidates on OPM registers; and (3) blocked registers, preventing the filling of a position by name request with a highly-qualified candidate discovered by NIST.

Agency-based hiring gives NIST authority to establish its own registers, rather than having to go through OPM registers. This saves time, even when the action does not qualify for the direct-hire method. Under the agency-based process, NIST personnelists examine qualifications and rate and rank candidates just as OPM examiners do, but NIST can complete the process quicker.

An example of the successful application of the agency-based process is the following:

- a female Ph.D. computer specialist and a female mathematician hired into the Computing and Applied Mathematics Laboratory; without agency-based hiring, these appointments would have been prevented by blocked registers.

DIRECT-HIRING:

NIST has expanded the direct-hiring process under the project by justifying the use of direct-hire for any hard-to-fill scientific or engineering position or any position in an occupation for which OPM pays a "special rate." Direct-hire allows NIST to fill a position with a qualified candidate without going through the formal posting and competitive process. NIST may choose to post the position and conduct an intensive search for candidates, but when a good candidate is found the candidate may be hired immediately. Examples are the following:

- three Ph.D. mathematical statisticians hired by the Computing and Applied Mathematics Laboratory after a national search in a highly competitive market. As soon as each candidate was found, an immediate offer was made and the candidate was hired within the time window established by the candidate.

- a physical scientist and a physicist with scarce technical specialties hired into the Asbestos Analysis Project, with an estimated savings of three months in hiring, at a time when these specialties were needed to fulfill NIST's responsibilities under the Asbestos Hazards Emergency Response Act.

- a leading biologist retiring early from Ciba Corning with 35 patents and over 100 publications hired into the Biotechnology Division. Direct-hire enabled the Division to act quickly before the candidate accepted a competing offer.

- two Ph.D. physicists with unusual backgrounds in precision measurement were recruited quickly to fill urgent needs in the Quantum Metrology Division with the help of direct-hire methods.

- the speed of direct hiring helped the Ionizing Radiation Division hire one of the few black Ph.D. physicists to enter the job market in 1988.

- direct-hire was cited by the Time and Frequency Division as the tool that allowed them to hire an electronics engineer who had other offers.

- two accountants and an accounting technician were direct-hired into the Office of the Comptroller.

- the Ceramics Division cited direct hire as a critical factor in hiring a female Ph. D. materials research engineer and a Ph.D. research chemist with scarce qualifications in solid state nuclear magnetic resonance analysis.

- after a year of searching for a chemical engineer with experience in molding of composite materials, the Polymers Division was able to hire a Ph.D. chemical engineer through the help of direct hire.

- the Electromagnetic Technology Division cited direct hire as instrumental in recruiting three Ph.D. physicists, one of whom was female, and an M.S. physicist.

PAID ADVERTISING

Before the project it was necessary to demonstrate that unpaid methods were not successful in attracting candidates before paid advertising could be used. This requirement often delayed filling a position for which paid methods were necessary to reach the most productive sources. Under the project, paid advertising may be used at the very beginning of the recruitment effort.

Many of the scientific and engineering hires cited under "flexible entry salaries" and "direct hiring" were facilitated by paid advertising. Other examples are the following:

- a B.S. in business management was attracted through a paid advertisement to fill an accountant position in the Office of the Comptroller.

- a highly qualified candidate with a B.A. in business management was attracted to a vacant supervisory printing specialist position through a paid advertisement.

MORE FLEXIBLE PAY FOR CURRENT EMPLOYEES THROUGH PAY BANDING AND PAY-FOR-PERFORMANCE

To improve the organization's ability to retain top performers and employees with vital and scarce skills, the project provides several tools:

1. Annual performance increases. In the General Schedule system, an employee in the mid or upper range of a grade could get a step increase only once every two or three years, respectively. Under the project, which replaced steps with pay-for -performance, each covered employee is eligible for an increase every year.

2. Higher potential performance increases. In a pay band system, the performance pool is augmented by money previously spent on promotions from one grade to the next higher grade, where both grades are now in the same pay band. This money, along with previous step increase, quality increase, and PMRS increase money, provides more generous salary increases for top performers.

3. Potential for quicker promotions. In the former General Schedule system, an employee was required to spend at least one year in grade for promotion eligibility. In the project system, an employee must spend at least one year in a pay band for promotion eligibility. Because each band below the highest band covers at least two grades, promotions are potentially more rapid.

4. Higher potential pay increases upon promotion. In the previous system, the required pay increase upon promotion was the equivalent of two step increases in the general workforce (about 6%) and 6 percent in the PMRS system. Under the project, the required pay increase upon promotion is 6 percent minimum, with no maximum (short of the maximum rate of the new band).

Examples of the application of these tools are the following:

- the Systems and Software Technology Division was able to retain an outstanding computer scientist through the higher promotion and performance pay increases allowed by the project.

- the Quantum Physics Division cited the potential for more-rapid salary increases as the reason they were able to retain the minority supply specialist who was experienced in using both the NIST and University of Colorado procurement and administrative systems to manage the JILA facility.

- the Reactor Radiation Division has used the more flexible pay features to more effectively retain reactor operators through salaries more comparable to those at other research and commercial reactors.

- the Polymers Division was able to retain a highly qualified Ph.D. chemical engineer with critical and highly marketable skills through the higher pay increases available for outstanding performers.

- the Electromagnetic Fields Division used the potential for more generous salary increases for top performers to retain a Ph.D. physicist who has made major contributions to the organization.

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The **Chairman**. The Chair would like to commend the gentlelady from Maryland for her proposed report language. The personnel practices referred to there have been a matter of substantial progress for NIST and deserve considerable additional attention, and the report will give that to them.

Mrs. **Morella**. Thank you, Mr. Chairman.

The **Chairman**. Are there any objections to the report language proposed? If not, that will be included.

Mr. Boehlert has some suggested report language which has been distributed.

May the Chair request that the staff on both sides alert the members to the fact that we will vote in about five minutes on final passage and would appreciate their attendance?

Mr. **Boehlert**. Mr. Chairman, the report language that I am offering, which is now before us, simply reaffirms the committee's strong support for the Boehlert-Rockefeller State Technology Extension Program, which is designed to bring together two of the great wellsprings of innovation and growth in our economy, NIST national labs and small manufacturing firms. This was established, as we know, under the 1988 Omnibus Trade and Competitiveness Act, and it authorizes the National Institute of Standards and Technology to make grants to State governments, enabling them to create or expand their technology extension services.

Many countries, Mr. Chairman, most notably Japan, have long used technology extension service approaches to reach their small and medium sized manufacturers, keeping them on the cutting edge of technology and technique. The Office of Technology Assessment lauded the promise of technology extension efforts in its 1990 report on competition in manufacturing, "Making Things Better."

Dollar for dollar, Boehlert-Rockefeller is one of the most effective technology transfer programs run by the Federal Government. Modeled on the Agricultural Extension Service, which for a century, has successfully bridged the gap between universities and farmers, the State Technology Extension Program is helping State technology services to get their people out in the field to conduct onsite visits, make detailed assessments of the needs of the small and medium sized firms, and help move NIST's insights and innovations out of the lab and into the marketplace.

The proposed report language that I offer today simply affirms the importance of the State Technology Extension Program and the committee's desire to see it continued with full support.

[The report language offered by Mr. Boehlert, and the prepared statement in support thereof, follow:]

STATEMENT BY THE HONORABLE SHERWOOD BOEHLERT (R-NY) BEFORE THE HOUSE SCIENCE, SPACE, AND TECHNOLOGY COMMITTEE

MAY 1, 1991

Mr. Chairman, I offer report language in support of the Boehlert-Rockefeller State Technology Extension Program (STEP). STEP is designed to bring together two of the great wellsprings of innovation and growth in our economy: NIST's national labs and small manufacturing firms. Established under the 1988 Omnibus Trade and Competitiveness Act, Boehlert-Rockefeller authorizes the National Institute of Standards and Technology to make grants to state governments enabling them to create or expand their technology extension services.

Many countries, most notably Japan, have long used technology extension service approaches to reach their small and medium-sized manufacturers, keeping them on the cutting edge of technology and technique. The Office of Technology Assessment lauded the promise of technology extension efforts in its 1990 report on competition in manufacturing, Making Things Better.

Dollar for dollar, Boehlert-Rockefeller is one of the most effective technology transfer programs run by the federal government. Modeled on the agricultural extension service, which for a century has successfully bridged the gap between universities and farmers, Boehlert-Rockefeller is helping state technology services get their people out into the field to conduct on-site visits, make detailed assessments of the needs of small and medium-sized firms, and help move NIST's insights and innovations out of the lab and into the marketplace.

The proposed report language that I offer today simply affirms the importance of the State Technology Extension Program, and the Committee's desire to see it continue to support it.

REPORT LANGUAGE
FOR THE
AMERICAN TECHNOLOGY PREEMINENCE ACT OF 1991

OFFERED BY MR. BOEHLERT

The Boehlert-Rockefeller State Technology Extension Program

The Committee continues to strongly support the Boehlert-Rockefeller State Technology Extension Program (STEP), which was created in the Omnibus Trade and Competitiveness Act of 1988. This bill authorizes funding to extend the life of the program

Many of the most innovative ideas for improving the nation's competitiveness come out of the states, which have an intimate familiarity with the needs of their industries. The STEP program is designed to encourage such innovative thinking and to facilitate the transfer of federally developed technology and know-how to smaller manufacturers. Congress has increasingly acknowledged the need for such activity. The Defense Authorization Act of 1990, for example, calls for the Department of Defense to work more closely with states and contractors to modernize smaller suppliers. The law specifically mentions STEP as one of the best avenues to accomplish this goal.

In STEP's first year of operation, NIST entered into cooperative agreements with nine states to support a wide range of activities, including extending the reach of the Manufacturing Technology Centers, which have the same goals as the STEP program. In Fiscal Year 1991, NIST intends to award funds to help states coordinate existing federal and state extension activities. NIST has also run a wide variety of workshops for manufacturers and states, and has set up an electronic bulletin board with STEP monies. The Committee expects to see the program expanded in Fiscal Year 1992 so that funds can once again be awarded for new extension activities including multi-year activities and so that the other STEP initiatives can be expanded.

Mr. **Valentine**. Mr. Chairman?

The **Chairman**. The Chair recognizes the gentleman from North Carolina.

Mr. **Valentine**. Mr. Chairman, I would like to say that the staff of our Technology and Competitiveness Subcommittee has examined the gentleman's language, and we have no problem with it. We accept it.

The **Chairman**. Thank you.

Is there any further discussion of the report language? If not, all those in favor, signify by saying aye.

[Chorus of ayes.]

The **Chairman**. Opposed, no.

[No response.]

The **Chairman**. The ayes have it.

Is there any other proposed report language from any member?

Mr. Thornton, did you have some additional views that you wished to be included?

Mr. **Thornton**. Mr. Chairman, I do have additional views that I would like to request be included unless the report language is regarded to suffice for those.

The **Chairman**. The gentleman will have to make that decision. If he desires additional views, they are his sole responsibility and they will be included.

Mr. **Thornton**. Thank you, Mr. Chairman.

[Additional views of Mr. Thornton follow:]

Additional View for American Technology Preeminence Act
Offered by Mr. Thornton

This bill is an important step toward facilitating the application and commercialization of innovative technologies through emphasis on American technology preeminence. It is an example of the new strategies we should be using as part of a Marshall Plan for America to stimulate our own economic growth.

The United States has been losing its competitive edge in several areas of high technology, and our technological infrastructure has slipped badly in several important fields. I have been calling for a Marshall Plan for America to develop strategies for ourselves as appropriate for our needs as those we employed with such success in rebuilding Europe and Japan after World War II. Encouraging manufacturing within our own borders rather than exporting technologies abroad should be part of such a strategy.

The CHAIRMAN. I have been asked by Mr. Wolpe for unanimous consent to include a statement in the record of the markup. Without objection, that will be included.

[The prepared statement of Mr. Wolpe follows:]

** Mr. Chairman. I am pleased support the legislation before us today, the American Technology Preeminence Act and I commend the members of the committee and staff for crafting a fine product.

** I believe our committee has developed a comprehensive competitiveness package which accomplishes the dual purpose of stregthening our traditional research programs and, at the same time, creating the Advanced Technology Program to promote emerging civilian technologies, and [illegible] to protect Amer trading interests in these countries.

** I am also pleased that this bill includes an amendment from last year' markup that I offered with Chairman Brown and former Congresswoman Schneider, to create a pilot program to assist other countries in the development of international standards.

** This provisions is a low-cost/high-impact method of export promotion. Our proposal to spend no more than $250,000 annually to match private spending is exactly the kind of competitive, good export-promotion bargain that we should be supporting.

** Based upon Science Committee interest in this project, last year NIST began a pilot with Saudi Arabia. In this case, we are talking about a significant amount of trade; the U.S. exports exceeded $6 billion in 1989 alone.

** Other major exporting countries of Europe and Asia have recognized the trade value with the Saudis and are investing heavily in export promotion through standard-setting. These countries have been increasing their share of the Saudi market while the U.S. share has been declining.

** However, we believe we can reverse this trend with our standards-assistance program. In fact, in just one year, OUT OF 250 DRAFT STANDARDS OFFERED BY THE U.S. OVER 100 U.S. DRAFT STANDARDS HAVE BEEN INCORPORATED VERBATIM INTO THE SAUDI CODE.

** This provision is a low-cost but high-impact countermeasure. It would b extremely should-sighted, particularly at a time of such huge trade deficit and when U.S. economic growth depends so heavily on increasing exports, to allow the alternative of letting hundreds of millions of dollars in poter U.S. exports go down the drain.

** While we have begun to assist Saudi Arabia, there are many other countries that have requested our assistance including Brazil, India and Israel. Now is the time to address our trade deficits and I am pleased that the Committee has recognized this by adding this significant effort.

The **Chairman**. If there is no further debate, we are now at the point when we need a motion to report the bill.

Is there a pigeon on this side?

Mr. **Walker**. Mr. Lewis is going to handle it, Mr. Chairman, but I would suggest that we do not have a quorum present for purposes of reporting the bill.

The **Chairman**. We do not have a quorum present; the gentleman is correct.

Mr. **Volkmer**. Mr. Chairman, can't we go ahead and have the motion made and hold the vote open for an hour or so so the rest of us don't have to sit here? We have done that other times.

The **Chairman**. The Chair would like to proceed, of course, according to the will of the committee.

Mr. **Walker**. Mr. Chairman, I was just going to suggest that I think the alternative available to us would be to go ahead and have a recorded vote and then hold the vote open for all members to come in over the next hour or so to record their votes.

The **Chairman**. The gentleman is extremely persuasive.

[Laughter.]

The **Chairman**. I am going to follow his recommendation.

Mr. Lewis?

Mr. **Lewis**. Thank you, Mr. Chairman.

I move that the committee report the bill, H.R. 1989, as amended, and instruct the staff to prepare the legislative report and to make technical and conforming amendments, and that the Chairman take all necessary steps to bring the bill before the House for consideration.

The **Chairman**. You have heard the motion. The Chair proposes that the clerk call the roll.

The **Clerk**. Mr. Brown?

The **Chairman**. Aye.

The **Clerk**. Mr. Walker?

Mr. **Walker**. No.

The **Clerk**. Mr. Scheuer?

Mr. **Scheuer**. Aye.

The **Clerk**. Mr. Sensenbrenner?

[No response.]

The **Clerk**. Mrs. Lloyd?

Mrs. **Lloyd**. Aye.

The **Clerk**. Mr. Boehlert?

Mr. **Boehlert**. Aye.

The **Clerk**. Mr. Glickman?

Mr. **Glickman**. Aye.

The **Clerk**. Mr. Lewis?

Mr. **Lewis**. Aye.

The **Clerk**. Mr. Volkmer?

Mr. **Volkmer**. Aye.

The **Clerk**. Mr. Ritter?

Mr. **Ritter**. Aye.

The **Clerk**. Mr. Wolpe?

Mr. **Wolpe**. Aye.

The **Clerk**. Mr. Morrison?

[No response.]

The **Clerk**. Mr. Hall?

Mr. **Hall**. Aye.
The **Clerk**. Mr. Packard?
Mr. **Packard**. No.
The **Clerk**. Mr. McCurdy?
[No response.]
The **Clerk**. Mr. Henry?
[No response.]
The **Clerk**. Mr. Mineta?
Mr. **Mineta**. Aye.
The **Clerk**. Mr. Fawell?
[No response.]
The **Clerk**. Mr. Valentine?
Mr. **Valentine**. Aye.
The **Clerk**. Mr. Slaughter?
[No response.]
The **Clerk**. Mr. Torricelli?
[No response.]
The **Clerk**. Mr. Smith?
Mr. **Smith**. No.
The **Clerk**. Mr. Boucher?
[No response.]
The **Clerk**. Mrs. Morella?
Mrs. **Morella**. Aye.
The **Clerk**. Mr. Bruce?
[No response.]
The **Clerk**. Mr. Rohrabacher?
Mr. **Rohrabacher**. Aye.
The **Clerk**. Mr. Stallings?
Mr. **Stallings**. Aye.
The **Clerk**. Mr. Schiff?
Mr. **Schiff**. Aye.
The **Clerk**. Mr. Traficant?
[No response.]
The **Clerk**. Mr. Campbell?
[No response.]
The **Clerk**. Mr. Nowak?
Mr. **Nowak**. Aye.
The **Clerk**. Mr. Rhodes?
[No response.]
The **Clerk**. Mr. Perkins?
[No response.]
The **Clerk**. Mr. Barton?
Mr. **Barton**. No.
The **Clerk**. Mr. McMillen?
[No response.]
The **Clerk**. Mr. Zimmer?
[No response.]
The **Clerk**. Mr. Nagle?
[No response.]
The **Clerk**. Mr. Gilchrest?
Mr. **Gilchrest**. No.
The **Clerk**. Mr. Hayes?
[No response.]
The **Clerk**. Mr. Costello?

[No response.]

The **Clerk**. Mr. Tanner?

Mr. **Tanner**. Aye.

The **Clerk**. Mr. Browder?

Mr. **Browder**. Aye.

The **Clerk**. Mr. Geren?

Mr. **Geren**. Aye.

The **Clerk**. Mr. Thornton?

Mr. **Thornton**. Aye.

The **Clerk**. Mr. Bacchus?

Mr. **Bacchus**. Aye.

The **Clerk**. Mr. Roemer?

[No response.]

The **Clerk**. Mr. Cramer?

Mr. **Cramer**. Aye.

The **Clerk**. Mr. Swett?

[No response.]

The **Clerk**. Mr. Kopetski?

Mr. **Kopetski**. Aye.

The **Clerk**. Ms. Horn?

Ms. **Horn**. Aye.

The **Clerk**. Mrs. Collins?

Mrs. **Collins**. Aye.

The **Chairman**. Are there any other members who desire to record their vote. If not, then without objection, the Chair will remain here and hold the roll call open until such time as a majority of the committee members have been able to cast their votes.

The Chair asks the staff on both sides to notify members that he will be here for about half an hour to get their votes.

With that, the members are excused. I can't adjourn the committee until we have gotten a quorum present to vote on this.

[Whereupon at 12:26 p.m., the committee recessed, to reconvene at the call of the Chair.]

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